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Report

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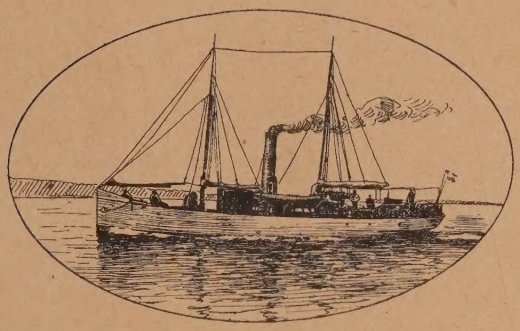
of

The Danish Biological Station

to

The Board of Agriculture.



XXI.

1913.

By

C. G. Joh. Petersen,
Ph. D., L. L. D.
Director.

Translated from „Fiskeri-Beretning for 1912".

Copenhagen.
Centraltrykkeriet.
1914.

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Valuation of the Sea II.

The animal communities of the sea-bottom and their importance for marine zoogeography.

(With 6 Plates, 3 Charts and an appendix.)

By C. G. Joh. Petersen.

In the last Report, XX 1911, I described a new apparatus, a bottom-sampler, by means of which we are able in each haul to take up all the animals living on and in the sea-bottom over an area of 0,1 m^2; several examples of the results obtained were given, while it was pointed out at the same time, that many more experiments were needed before we could judge of the quantities of animals living on the sea-bottom of the various Danish waters. A large number of such samples of the animal life of the sea-bottom (valuations) have now been made at about 200 different places during 1911 and 1912, the greatest number between the Skaw and Gedser, some in the North Sea and some in the Skagerrak down to a depth of about 300 meters.

Such a large work could naturally only be carried out with the assistance of the whole crew of the Biological Station; Assistant cand. mag. *H. Blegvad* has rendered good service aided by the crew onboard, several of whom have gradually attained to great skill in the use of forceps and in separating out the different species; even the Latin names are known to these sailors.

In the determination of many animals excellent assistance has been rendered by the scientists of the Zoological Museum of Copenhagen, to whom I herewith return my best thanks.

Each of these valuations (see Appendix), giving the name of the species, number of individuals and rough weight, represents the animals found on 1 m^2 of sea-bottom; often just 10 samples of 0.1 m^2, i. e. 1 m^2, have been taken, but sometimes more of 0.1 m^2 or 0.2 m^2; in this case the quantity of animals has been recalculated to 1 m^2, in order to facilitate the comparison of the valuations; this gives fractions of individuals.

In the valuation lists further the rough weight of each species is given in gms. and below the total rough weight. The number in brackets

below this gives the quantity of organic dry stuff of all the species, exclusive of shells or worm-tubes and the like. The percentages of dry-stuff determined by *Boysen Jensen* for each species or for closely related forms constitute the basis of these calculations.

On studying the tables accompanying this paper it is easily seen, that there is a great difference in the animal life of the various places and I still retain a vivid series of pictures from earlier studies, though these were only based on dredgings. The zoological literature is rich in works of authors such as *Lovén, Milne-Edwards, Forbes, Sars* and later *Pruvôt, Appelløf* etc., who have seen that such easily observed differences occur; but in the descriptions or characterization of the differences between the animal communities they have not reached very far. This is partly due to the fact, that only dredges have been used in the older investigations and partly to the too long lists of species; for the long lists just obscure the differences especially if not accompanied hy quantitative information, which can emphasize the characteristic species by comparison with the less important. As will be dealt with further in the sequel, a dredge is of no use for a true characterization of the animal communities, for it mostly collects the larger animals of scattered occurrence, leaving behind the small but much more numerous forms buried in the bottom of the sea. I am of opinion that by means of the few species which constitute the main quantity of the animals in the communities, we are able to give a better characterization than has previously been possible and I shall endeavour to prove this in the sequel.

It is obvious beforehand, that every single species occurring on the valuation lists is not of the same importance, either for characterization of the community as such or for characterization of the outer conditions on which the existence of the community is dependent; many animals only occur in quantity at certain times of the year, hence called seasonal animals; from the different quantities in which they occur on the lists we are, therefore, in general not able to draw any conclusions as to the composition of the community. Other animals occur so sparsely on the lists, that they must be considered as being so scarce, that they only exceptionally come into the small areas investigated (e. g. large Molluscs) and no importance can therefore be attached to their absence or presence. It is consequently impossible by means of a single valuation list, giving the number and quantity of the species of animals from a certain community, to directly indicate the animals characteristic of that community. Only by experience gained from different places are we able to determine this. For example, *Cyprina islandica* is often present in large quantities on the valuation lists, but it has been found with regard to *Cyprina*, that it is not at all places of such uniform and dense occurrence, that we can expect to find one specimen on each 1 m^2; it may also be possible that the apparatus does not always dig deep enough. Scattered occurrences of single animals outside their true areas may be due to transport with drifting sea-weed or the like; in certain years special hydrographical conditions may possibly also cause a species to thrive outside its general area of occurrence and to keep there for some time; several examples hereof have been described in the literature (*H. Théel*). The animals, which are not seasonal and which compose an important part of the whole mass of the community,

E. v.

Nr. 15. pr. 1 m²	Nos	Rough weight
Tellina fabula	10,4	0,480
Solen sp.	Fragm.	0,080
Mactra subtruncata juv.	0,4	0,004
Venus gallina	7,6	1,640
Montacuta ferruginosa	2,0	0,040
Natica catena	0,4	1,040
Bela turricula	0,4	0,160
Lacuna divaricata	0,4	0,004
Aricia armiger	1,2	0,062
Nephthys sp.	Fragm.	1,116
Ophelia limacina	0,8	0,062
Pectinaria Koreni	0,4	0,080
Ophioglypha texturata	0,4	0,120
Echinocardium cordatum.	18,0	276,000
Gammaridæ	6,4	0,200
		281,088
		(9,360)

East of Hulsig.

Fine sand without appreciable over-layer.

(A little growing Zostera.)

The botton-sampler dug about 5 cm deep in the ground. — 25 samples of 0,1 m². — 7 meters depth. — 7th July 1911.

E. T.

Nr. 14. pr. 1 m²	Nos	Rough weight
Abra alba?	1,6	0,52
» nitida	1,2	
Tellina fabula	4,8	0,60
Mya sp.	0,4	0,24
Solen pellucidus	12,4	3,40
Axinus flexuosus	12,0	1,16
Nucula nitida?	16,4	3,96
Bela turricula	0,4	0,04
Aporrhais pes pelecani	1,6	7,60
Turritella terebra	∞	96,00
Nephthys sp.	4,0	0,67
Ammotrypane aulogaster.	0,8	0,17
Maldanidæ	Fragm.	0,52
Pectinaria auricoma	1,2	0,12
Phascolosoma	18,4	2,48
Ophiotrix fragilis	0,4	0,20
Amphiura Chiajei	0,8	0,24
» filiformis	∞	49,92
Ophioglypha albida	1,6	0,84
» texturata	0,4	1,28
Asterias rubens	0,8	4,20
Echinocardium cordatum	15,2	136,00
Gammaridæ	1,2	0,04
Portunus sp.	0,4	5,92
Paguridæ	4,4	1,36
Ascidiæ	0,4	1,00
		318,48
		(20,912)

3 sea miles S. of Skagen harbour.

Dark sand with fine detritus, brown over-layer.

25 samples of 0,1 m². — 12—19 meters depth.

7th July 1911.

Nr. 16. pr. 1 m²
Abra nitida
Corbula gibba
Solen pellucidus
Venus gallina
Lucina borealis
Cyprina islandica
Cardium echinatu
Montacuta sp.
Nucula sp.
Aporrhais pes pel
Turritella terebra
Cylichna sp.
Philine sp.
Dentalium entalis
Glycera sp.
Aricia sp.
Nephthys sp.
Maldanidæ
Pectinaria auricon
— belgica
Phascolosoma
Amphiura Chiajei
» filiform
Ophioglypha albic
Brissopsis lyrifera
Echinocardium co
Gammaridæ
Paguridæ
Ebalia Cranchii
Pennatula phosph
Ascidiæ

6,5 sea-miles S

Fine sand with fi

layer; dark s

25 sampler of 0

7th July

In the valuation lists the w

n Kattegat.

os	Rough weight
3,2	0,080
0,4	0,008
5,4	1,360
1,2	0,040
0,8	0,640
0,4	0,020
1,2	17,640
0,4	0,004
0,4	0,004
0,4	1,760
8,0	154,000
2,4	0,080
0,8	0,040
1,2	1,240
0,8	0,400
0,4	0,400
1,6	0,400
gm.	0,400
6,8	0,400
3,2	0,320
+ ∞	83,480
1,6	0,600
5,2	130,000
8,4	90,000
2,8	0,080
7,2	1,640
0,4	0,080
0,4	0,640
0,4	0,080
	485,836
	(31,704)

to S. ½ S. of

istinct brownish

lowermost.

5 meters depth.

14,0° C.

B. T.

Nr. 19. pr. 1 m²	Nos	Rough weight
Abra nitida	0,4	0,040
Corbula gibba	1,6	0,040
Cyprina islandica juv.	0,4	0,040
Cardium minimum	0,4	0,004
Nucula sulcata	0,4	0,440
Nassa pygmæa	0,8	0,080
Turritella terebra	36,4	17,560
Harmothoë sp.	0,4	
Lumbrinereis fragilis	Fragm.	4,600
Cirratulus sp.	c. 20,0	
Nephthys sp.	Fragm.	4,600
Pectinaria auricoma	2,8	2,120
Amphiura Chiajei	∞	33,920
» filiformis		
Brissopsis lyrifera	10,0	56,000
Gammaridæ	3,6	0,280
Diastylis sp.	0,4	0,004
Pennatula phosphorea	16,4	9,760
Ascidiæ	0,4	2,240
		131,728
		(11,848)

16 sea-miles S. E. by E. of Skagen Light.
Gray Kattegat clay with brown over-layer.
25 samples of 0,1 m². — 35 meters depth.
10th July 1912. Temp. in the clay 13,4° C.

B. n.

Nr. 20. pr. 1 m²	Nos	Rough weight
Abra nitida	2,4	0,20
Saxicava rugosa	1,2	0,04
Axinus flexuosus	1,2	0,02
Nucula sulcata	34,4	24,12
Cylichna sp.	0,8	0,04
Lumbrinereis fragilis	1,2	0,65
Glycera sp.	5,6	3,89
Nephthys sp.	Fragm.	0,32
Cirratulus sp.	9,2	1,30
Eumenia crassa	0,4	0,32
Maldanidæ	∞	
Ampharetidæ	+	0,60
Pista cristata	0,4	
Pectinaria auricoma	Fragm.	0,28
Amphiura Chiajei	12,0	2,36
Brissopsis lyrifera	4,8	120,00
Crustacea	6,4	0,72
Pennatula phosphorea	0,4	0,48
Actiniidæ	0,4	0,32
Myxine glutinosa	0,4	2,92
		158,60
		(9,008)

8 sea-miles West of Vinga.
Light Kattegat clay with brown over-layer.
25 samples of 0,1 m². — 50—52 meters depth.
10th July 1911. Temp. in the clay 8,6° C.

ys indicated in grammes.

owing to number or weight, will presumably be best suited for characterizing the community and must also be considered as giving a good idea of the outer conditions on which the community is dependent.

In the following I intend to show, how such characteristic animals occur in Danish waters and to what extent they are of use for the characterization of the prevailing animal communities; in what degree just this word community is the right designation for the animals living at a certain place will be discussed later.

In the Northern Kattegat 5 valuations Nos. 15, 14, 16, 19 and 20 form a section from shallow to deep water, from the coast at a depth of 7 meters out to the deep water in the Eastern Kattegat about 50 meters. At No. 15 the shallowest station 15 species of animals were found per 1 m^2 weighing altogether 281 gms. (rough weight). The most abundant species was *Echinocardium cordatum* with 18 specimens weighing altogether 276 gms., thus greatly predominating in weight; nearest to this in number come *Tellina fabula* and *Venus gallina* with 10.4 and 7.6[1]) individuals respectively; their weight however is inconsiderable. For the present I shall characterize this fauna or rather this animal community as an *Echinocardium* community with *Tellina fabula* and *Venus gallina*, and designate it E. v.

The next station No. 14, taken in a little deeper water (12—19 meters), has 26 species of animals with a total rough weight of 318 gms. per 1 m^2. The main quantity consists of *Echinocardium* (116 gms., 15.2 individuals[1]), *Turritella terebra* with 96 gms. and some hundred of specimens, of uncounted *Amphiura filiformis* with about 50 gms.; by comparison with these the weight of all the other animals is small, but of certain Lamellibranchs, *Solen pellucidus, Axinus flexuosus, Nucula nitida?* more than 12 specimens occur per 1 m^2.

I call this an *Echinocardium-Turritella* community with its accompanying animals, especially *Amphiura filliformis*, and designate it E. T.

The following station, No. 16, in still deeper water, namely 24.5 meters, has 486 gms. of rough weight, the main quantity consisting of *Turritella* with 154 gms. and 228 individuals, *Echinocardium* with 90 gms. and 8.4 individuals[1]), another Echinoderm *Brissopsis lyrifera* with 130 gms. and 5.2 individuals[1]) and of *Amphiura filiformis* and a small quantity of the closely related *A. Chiajei*, weighing together 83 gms., individuals uncounted. The weight and number of all the other animals are of no importance compared with the above mentioned; only one specimen (1·2)[1]) of *Cardium echinatum* weighs about 18 gms; but as it occurs very seldom, it must be considered as having only exceptionally come into the small areas investigated and its absence or presence is therefore accidental.

This community comprising the same common species as the preceding but also *Brissopsis,* though with a greater weight than *Echinocardium*, is designated B. E. T. and forms a transition to the following station, the pure *Brissopsis-Turritella* community (B. T.) of St. 19 at a depth of 35 meters, where *Brissopsis, Turritella* and the two *Amphiura* greatly outweigh all the others and

[1]) The fractions are from 25 samples reduced to 10 = 1 m^2.

in reality only *Pennatula phosphorea* with 16 individuals and ca. 10 gms. of rough weight are of some though but little importance in weight and number; this species had already appeared in small quantities at the transitional station No. 16.

On going out still deeper, to 50—52 meters at St. 20, *Brissopsis* claims 120 gms. of the total rough weight, which is 158 gms. and only another form, *Nucula sulcata* with 34.4 individuals and 24 gms., is of any importance. *Amphiura filiformis* has disappeared and *A. Chiajei* predominates with 12 individuals. This community is designated B. n. Certain Maldanids are present in large numbers and might perhaps, owing to their large number, be classed among the characteristic animals, but as their weight is very small and the species have not been distinguished, I have not taken them into consideration here, but admit that owing to my deficient knowledge of the worms and Crustacea and various other lower animals they have not been dealt with as they deserve; as a rule, however, their weight is so small compared with that of the other animals, that no error of any importance can have been made in neglecting them.

In this section we have thus come across the following communities:

1. E. v.	2. E. T.	3. B. E. T.	4. B. T.
Echinocardium,	*Echinocardium,*	*Echinocardium,*	*Brissopsis,*
Venus gallina,	*Turritella,*	*Brissopsis,*	*Turritella,*
Tellina fabula.	*Amphiura filiformis,*	*Turritella,*	*Amphiura 2 sp.*
	Solen pellucidus,	*Amphiura filiformis,*	
	Axinus flexuosus,		
	Nucula nitida?		

5. B. n.

Brissopsis,
Amphiura Chiajei,
Nucula sulcata.

As indicated above, they may be designated shortly by single letters: E. B. T. n., referring to the names of the characteristic species, n = *Nucula sulcata,* and v. meaning »Venus Lamellibranchs« or sand-dwelling Lamellibranchs, *Venus gallina* and *Tellina fabula,* to which also a few other Lamellibranchs may be referred; we shall return to this later.

In the Samsø Belt another section is formed by the stations 19, 20 and 21.

At St. 19 at a depth of 8 meters no Echinoderms occur; *Mytilus edulis* with 27 individuals composes 70 gms. of the total rough weight, which is 91.05 gms., then come *Nassa reticulata* with 6 gms., *Littorina littorea* with 5.55 gms., *Cardium edule* with 4.4 gms. and *Macoma baltica* with 4.3 gms. This may be called a Macoma community owing to the preponderance of this form and is designated by d.

At St. 20 with 195 gms. of rough weight *Macoma calcarea* has 86.6 gms.; then come *Neptunea antiqua* with ca. 45 gms., *Nephthys* with ca. 20 gms; of frequently occurring Bivalves may be mentioned *Abra alba* and *A. nitida, Astarte Banksii, Nucula tenuis* etc. *Ophioglypha albida* with 15 individuals weighs ca. 2 gms.; Spantangids are wanting. This is called the *Calcarea* community = c from the commonest and heaviest form occurring.

Section of Samsø Belt.

d.

Nr. 19. pr. 1 m²	Nos	Rough weight.
Macoma baltica 3—12 mm	72,0	4,30
Mya sp.	2,5	0,15
Cardium edule < 13 mm.	32,0	4,40
Mytilus edulis	27,0	70,00
Nassa reticulata	11,5	6,00
Littorina littorea	5,5	5,40
» » juv.	6,0	0,15
Lacuna divaricata	2,5	0,05
Hydrobia ulvæ	9,5	0,05
Phyllodoce maculata	Fragm.	0,12
Aricia armiger	»	0,03
Nephthys sp.	»	0,25
Gammaridæ	1,0	0,05
Idothea sp.	1,5	0,05
Diastylis sp.	1,0	0,05
		91,05
		(3,265)

3 sea-miles E. N. E. of Ordrup Næs,
(Sejerøbugten).
Pure sand with green Zostera.
The bottom-sampler dug 3—6 cm in the bottom.
20 samples of 0,1 m². — 8 meters depth.
1st August 1911. — Temp. 18,5° C.

c.

Nr. 20. pr. 1 m²	Nos	Rough weight.
Abra alba 5—15 mm	26	4,10
» nitida	20	1,40
Macoma calcarea 3—29 mm	157	86,60
Mya sp.	5	0,10
Corbula gibba	1	0,10
Solen pellucidus 30 mm	1	0,80
Venus gallina 7 mm	1	0,20
Astarte Banksii	27	3,10
Cardium fasciatum	14	0,30
Nucula tenuis 3—9 mm	67	4,70
Modiolaria nigra	1	0,10
Neptunea antiqua	1	44,90
Aporrhais pes pelecani	2	9,80
Phyllodoce maculata	Fragm.	9,80
Nephthys sp.	»	19,60
Maldanidæ	»	0,40
Terebellides Strømi	»	1,30
Nemertini	1	3,30
Ophioglypha albida	15	1,90
» texturata	1	1,90
Gammaridæ	32	0,50
Idothea sp.	1	0,10
		195,00
		(21,63)

5 sea-miles N. E. by E. of Sejerø Light.
Light, mixed clay and sand detritus
with brown layer.
10 samples of 0,1 m². — 18 meters depth.
1st August 1911. — Temp. 10,1° C.

In the valuation lists the weight is everywhere given

R. M. (E.)

Nr. 21. pr. 1 m²	Nos	Rough weight.
Macoma calcarea	6	8,30
Mya sp.	2	0,20
Solen pellucidus	1	0,20
Psammobia færøensis	1	0,10
Astarte Banksii	12	5,00
» borealis	1	0,50
Cyprina islandica.....	1	7,70
Cardium fasciatum	8	0,90
Leda minuta....	4	0,40
Nucula nucleus.....	16	1,80
» tenuis	1	0,20
Modiola modiolus	3	136,50
— » juv	2	0,30
Neptunea antiqua	1	0,40
Buccinum undatum	2	2,10
Trochus cinerarius.....	2	0,60
Acmæa testudinalis.....	16	0,20
Philine aperta.....	2	0,60
Chiton sp.	142	7,70
Lepidonus squamatus....	6	3,40
Glycera sp.	Fragm.	0,10
Nephthys sp.	»	8,20
Travisia Forbesi	2	0,50
Trophonia sp.	3	1,60
Maldanidæ	Fragm.	0,10
Pectinaria auricoma.....	11	3,20
Terebellidæ	Fragm.	3,10
Sabellidæ	1	0,40
Pomatoceros triqueter....	∞	3,85
Planaria	3	0,50
Ophiopholis aculeata.....	∞	13,40
Amphiura filiformis.....	+	2,70
Ophioglypha albida.....	10	0,60
» robusta.....	168	6,30
Echinocardium cordatum .	4	19,70
Echinocyamus pusillus...	33	1,20
Str. drøbakiensis	34	36,70
Psolus phantapus.....	12	37,80
Gammaridæ	5	0,20
Balanidæ	2	10,90
Actiniidæ	1	0,40
		328,55
		(26,65)

7 sea miles N. N. W. of Sejerø Light.
Coarse gravel with sand, clay and pebbles.
10 samples of 0,1 m² — 18 meters depth.
2nd August 1911. — Temp. 10,3° C.

in gms.

At St. 21 with the large rough weight of ca. 328 gms. the main quantity consists of *Modiola modiolus,* besides several Echinoderms, which have not as yet appeared as characteristic animals; but *Echinocardium* also occurs in no small quantities. This may be called a rich *Echinoderm* and *Modiola* community with *Echinocardium* = R. M. (E).

It is thus seen, that we are able on broad lines to give a vertical characterization of the main quantity of the animals, at least at the places chosen, by means of a few, either very common or very heavy species. The difference between the characteristic animals of the communities living in shallow or deep water is even so great, that none of these animals is common to both; this does not mean that no species are common to shallow and deep water, but that no species in its capacity of characteristic species occurs in both kinds of water. It is a well-known fact, that many of the species mentioned here have a wide bathymetric distribution reaching far beyond the depths of our small Danish waters, but whether they occur as characteristic animals there is unknown.

The next touchstone of the importance of these animal communities is their connection with the horizontal distribution in our Danish waters; do the communities characterized by them occur in continuous, restricted areas or are they found mixed with each other without any visible order?

We have altogether 5 valuations on Chart I, Nos 20, 13, 10, 25, 5, which in regard to characteristic animals agree with the above-mentioned B. n. station with *Brissopsis, Nucula sulcata* and *Amphiura Chiajei*, and a small quantity of or no *Amphiura filiformis*; these lie in the deep eastern Kattegat on soft, bluish clay bottom from west of Vinga down to due south of Anholt; on studying these 5 valuations (see App. pp. 1—2) their extreme uniformity with regard to characteristic animals as well as to the rarer species will be discovered. In regard to the bottom conditions, temperature and salinity, this area is very uniform and on the Chart forms a continuous whole, marked by an n. at each station; further, some other n's have been added on the Chart between these stations; these are either due to new investigations or have been extracted from the dredge journals kept in earlier years onboard the gunboat »Hauch«, when it has been noted in these that a similar fauna occurred; with the »Hauch« no quantitative determinations were made, but the common animals were as far as possible determined onboard and fortunately also the greater part of the characteristic animals.

Of the valuations marked B. T. with *Brissopsis, Turritella* and generally both the *Amphiura* species as characteristic animals we also have 5, i. e. Nos 16, 19, 42, 24, 4 (see App. pp. 2—4), from the Skaw down to a little south of Anholt; on the Chart they are noted by a T; supplementary T's have been added in a similar way as the above-mentioned n. These stations are also taken on rather soft bottom but in a little shallower water than the preceding, inside which they must be considered as forming a continuous belt closer towards the land; sometimes this belt owing to its narrowness has not been met with in these investigations, but it is evident from previous investigations that such a belt is probably found in almost all the sections of the Kattegat.

The two above-mentioned kinds of stations, *Brissopsis-Nucula sulcata* and *Brissopsis-Turritella*, abbreviated B. n. and B. T., fill up the whole of the dark-blue

area in the Kattegat (see Chart. I), namely, the *Brissopsis* region; towards the coast this is bounded by the light-blue *Echinocardium* region and only on the borders of these two regions do B. and E. occur in the same valuation; No. 16 S. E. of the Skaw and No. 4 south of Anholt mark the boundaries of the two areas; thus it is the rule that one of these communities excludes the other; B. fills up all the deep Kattegat marked by the dark-blue colour on the Chart, and E. predominates everywhere within this as far as the light-blue colour extends. Owing to the lack of sufficiently detailed investigations I am unable to draw a definite curve between B. n. and B. T. and the letters n and T must suffice in giving the necessary orientation on the Chart.

Further, it is seen that T is also found in the Echinocardium area; the valuations 14, 46, 41, 11, 31 (App. pp. 5—6) belong to this group. *Echinocardium*, *Turritella*, *Amphiura filiformis* with or without *A. Chiajei* are found in all of them. The depth is less than before, 18—30 meters and the bottom always more or less sandy; the red line on the Chart marks the inner boundary of this region, the dark-blue shade the outer boundary. This region E. T. is specially broad in Aalbaek Bay and still more so in the south-western Kattegat, where it extends from east of Hesselø (Lysegrundene) into the Samsø Belt; it also goes down into the Sound; but when it comes far south *Turritella* becomes reduced in number and weight and no longer occurs as characteristic animal, being sometimes absent altogether; the *Amphiurae* also decrease in number and it is more the accompanying mud-Bivalves *Abra nitida*, *Nucula tenuis* etc. together with *Echinocardium* which characterize the community; at these reduced *Turritella* stations no T is therefore placed on the Chart; their contents may be seen from the valuations accompanying this paper, Nos. 9, 33 and 35 in the south-western Kattegat and Nos 36 east of Kullen (App. pp. 7—8). No. 8 south-east of Hesselø on the other hand is of a different character and will be mentioned later when dealing with the Samsø Belt.

We have now seen, that all outside the red line of the Chart consists of B. n. surrounded by B. T., which is again surrounded by E. T., the latter however being greatly reduced towards the south as regards the quantities of Turritella; the area in the south-eastern Kattegat lying inside the black line is the only one not mentioned as yet.

Two of the three valuations from this area Nos 6, 7 and 22 (App. pp. 4—5) contain *Brissopsis*, Nos 22 on the other hand no Spatangids; this station is the only one taken in deep water in the Kattegat where no Spatangids have been found; at Nos 22 only 10 samples altogether have been taken, so that there is reason to believe that they do occur but only more scattered than at other places; but all these three valuations are of a special character. Not counting the »casual« *Cyprina*, *Pecten septemradiatus* is the predominant species of Bivalves; the *Amphiurae* are few in number or totally absent, *Ophioglypha robusta* on the other hand occurs in quantities at Sts. 6 and 22, *Lima Loscombii* is also present at the two last-named stations; otherwise, we find here several of the animals, both Bivalves and worms, that are common in the *Brissopsis* region, though however in small quantities. The predominant form at these stations is however the small Gammarid *Haploops tubicola;* ca. 3500 individuals have been found in 1 m^2, and its numer-

ous, not always inhabited, tubes projecting about 1 cm above the bottom (this is easily seen in the bottom sampler) evidently transform the whole character of the bottom; this is probably the reason why the *Brissopsis* fauna does not reach its normal development; *Turritella* and *Nucula sulcata* ought to be present in quantities here but of the latter only one specimen has been found at all three stations, of the first none at all. Why *Pecten septemradiatus* and *Lima Loscombii*, as may also be seen from the charts of the gunboat »Hauch's« cruises, so well thrive in this bottom, I do not know; perhaps it is because the tubes build a firm under-layer which prevents these forms from sinking down into the soft clay soil. Haploops is also found at several places further north in the eastern Kattegat, but as I know nothing about the quantities or the accompanying species, it is impossible for me to give a more exact determination of the position of these places; I prefer therefore only to mark out this large *Haploops* region in the southern Kattegat; as will be seen, it extends some way down into the *Echinocardium* region, per haps even further than is seen on the Chart, but is hardly so characteristically populated.

We have now dealt with all the animal communities in the Kattegat that I know of which lie outside the red line on the Chart, namely *B. n.*, *B. T. (Haploops)*, *E. T.* and the reduced (E. T.) in the southern Kattegat; we now approach the shallower waters inside the red line where the bottom is very sandy and even pure sand.

All the stations lying inside this line, as far in as the *Echinocardium* region extends, may be taken as one community, that of the sand-dwelling Bivalves with *Echinocardium; Cyprina* occurs here in larger quantities than at other places. The six deepest of these stations from ca. 18 to 30 meters differ somewhat, however, from the rest and will be dealt with first. These are Sts. 40, 26, 23, 30, 32, and 29 (App. pp. 8—10) situated on deep, sandy bottom and reaching from the eastern Kattegat down to Hjaelm. At several of these *Echinocardium cordatum* is accompanied by *E. flavescens* or by *Spatangus purpureus*, at the northernmost station No. 40 between Groves Flak and Fladen only *E. flavescens* is found. *Amphiura filiformis* occurs on 4 of these 6 stations and *Turritella* accompanied in shallower water by *Aporrhais* is also present at several of them; we thus see the relation to the E. T. stations further out at sea, also apparent from the small quantities of mud-Bivalves. Apart from *Cyprina* the Bivalves are not numerous, but of those characteristic for these deeper sand-stations may be mentioned *Abra prismatica*, *Psammobia faerøensis* and *Mactra solida*, while *Venus gallina* also occurs at the shallower stations which are very closely related to the deeper ones in the Kattegat (see later the North Sea). At No. 30 S.S.W. of Anholt *Modiola* is the characteristic Lamellibranch but of this later; *Macoma calcarea* predominates at Sts. 23, 29 and 32.

On Chart No. 1 I have not endeavoured to mark the boundary between these deeper and shallower stations. Owing to the many sand-dwelling Bivalves of both groups, represented for example by the *Venus*-group, I call them E. v., the group living deepest is marked E. (v.), the higher E. v. While E. (v.) has only been found in the eastern and southern Kattegat E. v. is present from the Skaw down over Aalborg Bay to the north coast of Sealand. At all the stations Nos.

15, 44, 43, 21, 27, 2, 34 *Tellina fabula* and *Montacuta ferruginosa* occur as characteristic Bivalves owing to their number, *Venus gallina* both owing to number and weight (App. pp. 10—12); towards the south, north of Isefjord, *Macoma calcarea* reappears in quantities at St. 34, as will be mentioned later; this station is the deepest of all, 18 meters, and with its 10 *Amphiura filiformis* and 6 *Nucula tenuis* forms the transition to the deeper E. (v.) stations. *Cyprina* does not seem to be so common as at the deeper stations but as already mentioned cannot very well be used as characteristic animal.

At St. 21 in Laesø Channel, where much ooze occurs in the sand, we naturally find many *Nucula nitida* and *Solen pellucidus*.

A surprisingly large amount of *Mactra subtruncata* fry occurs at St. 44 at Aalbaek; this fry was only met with towards the autumn (September) of 1912, as indicated by St. 15 from July 1911 lying in the neighbourhood of that station.

The last 6 valuations in the Kattegat, Sts. 1, 38, 37, 39, 28 and 12 (App. pp. 13—14) are taken so close to the land that they fall outside the *Echinocardium* region. Sts. 1 and 38 show a close relationship to the shallow E. v. stations; St. 28 is so poor that it only contains worms and Crustacea. We shall later deal with Sts. 12, 37 and 39.

Apart from the exceptions made in the preceding with regard to certain stations or species that have to be mentioned later, we have now divided the fauna of the whole Kattegat into the following 8 animal communities:

B. n., B. T., (*Haploops*), E, T. (reduced E. T.), E. (v.), E. v.

and the shallow sand by the coasts with a small quantity of animals; a characterization accomplished by means of quite few but characteristic species. It has thus been possible to make the characterization not only in sections from shallow to deep water, but the characteristic animals also occur in belts or zones, the main lines of which may be given on a chart, although drawn on a much reduced scale.

We shall now proceed to the Samsø Belt[1]) beginning inside the line Sealands Odde—Hjaelm. The entrance to this water is very narrow owing to the long banks running northwards from Sealands Odde; the belt itself is full of shoals and islands, among which Samsø and its surrounding shoals form a large, shallow basin with deep channels at the sides, causing strong currents to arise even down in deep water; the deep channels have therefore often sand-gravel or stony bottom and the soft clay soil is restricted to the larger, calmer valleys, which are not deeper than the channels, most often less deep.

From a topographical point of view we might expect that the reduced (E. T.) stations of the south-western Kattegat would also appear in the deeper parts of the Samsø Belt and this is also the case, as is seen from the three northernmost deep stations Nos. 23, 22 and 21 (App. p. 15); for *Echinocardium*, even a few *Turritella*, clay-Bivalves (*Nucula tenuis* etc.) and even *Amphiura filiformis* occur here, but with exception of the Echinoderms they occur no longer as characteristic animals; among the Bivalves, on the other hand, this is the case with *Modiola modiolus*, which is present in large numbers and very heavy; 278 individuals weighing more than 3000 gms. have been found on 1 m^2, where

[1]) Chart III shows the boundaries of the various waters.

they thus covered everything else; this species may even fill the whole bottom with a layer of living Molluscs on and among which may be found *Chiton sp.*, *Acmaea*, *Ophiopholis aculeata*, *Ophioglypha robusta*, *Trophonia plumosa*, often accompanied by *Pomatoceros triqueter, Psolus phantapus* and *Strongylocentrotus drøbakiensis*. Two other stations Nos. 5 and 10 east and north of Samsø are of the same type, and 6 and 9 lying very close to these two prove, by means of *Psolus* and *S. drøbakiensis*, their close relationship to them and show at the same time how this rich fauna may change within very small distances; both the two last-named lie in somewhat shallower water than 5 and 10 (App. pp. 16—17). This characteristic fauna marked R. M., i. e. rich Echinoderm and Modiola stations, is designated on the Chart by ●. *Modiola modiolus*, *Ophiopholis aculeata*, *Ophioglypha robusta* and several Echinoderms are the more dominant animals but it is also worthy of note, that *Echinocardium* and *Amphiura filiformis* generally occur as the characteristic animals of these communities, though in this capacity they belong to the reduced *Turritella* stations; we have here therefore a peculiar double fauna, often of a very local occurrence, which is evidently only found at places where the current is strong; for without this the animals covering the bottom would not get sufficient nutriment. This fauna must be considered as (E. T.) + R. M., where the reduced (E. T.) is the common fauna belonging to the smooth, soft sea bottom, uniformly distributed over vast areas, the animals of which generally live down in the bottom or creep about on the smooth soft soil (Ophiurids), while the other fauna R. M. lives above the bottom, either attached to hard objects, shells, stones or on the top of each other, so that they sometimes cover the entire bottom; in contrast to the mud-Bivalves *Modiola* thus always lives above the bottom, *Acmaea*, *Chitons*, *Balani*, *Ophiopholis*, *Trophonia* etc. on or among *Modiola;* we have here a kind of epifauna, a fixed fauna, which is found on more or less hard bottom; it occurs therefore in patches in the deep channels, on stones or shipwrecks or any solid objects sinking down on the sea-bottom and requires flowing water to be able to thrive. Its occurrence is therefore local and scattered and it certainly seldom covers large, connected areas; but here in the Samsø Belt, which forms the threshold between the Kattegat and the inner Danish waters, it is of specially frequent occurrence. In similar flowing waters such as west of Samsø, in the channels round Sprogø in the Great Belt and in the deep, rapid, narrow Sound north of Hveen the fauna is also present, as in seen from the round black dots. on the Chart, and even in the Kattegat its presence has been ascertained, as already mentioned, from St. 30 south-west of Anholt and St. 8 south of Hesselø; a few black, round dots in the neighbourhood of these stations show that a marked R. M. fauma is undoubtedly found close by, and thus may possibly also be present at several other places in the Kattegat (Laesø Channel) always where there is flowing water and deep channels in the sea bottom.

All the other stations in the Samsø Belt inside the *Echinocardium* region, marked on the Chart by a round red dot, are very closely related to each other, though there is the difference that the deepest have the greatest number of species, mainly owing to the large quantity of mud Bivalves from the Kattegat, sometimes also to its Venus group, though none of these occur as characteristic animals; this is on the other hand the case with two other Bivalves *Abra alba* and *Macoma*

calcarea. By marking these two b. and c. all the *Echinocardium* stations in Samsø Belt that are not R. M. (E. T.) must be marked E. b. c., but other forms, such as *Nucula tenuis*, *Leda pernula* and *Leda minuta*, *Axinus flexuosus*, *Montacuta ferruginosa*, *Cyprina islandica*, *Astarte* species and *Ophioglypha albida* and *O. texturata*, are also present at many of them. Towards the coast in shallower water and in the most landlocked waters the number of species as also their quantity and weight decrease considerably, only E. for a long time retains its frequency. The stations 25, 26, 27 a and b, 20, 15, 7, 4, 3, (App. pp. 20—23) belong to the richer, deeper group of E. b. c.; the stations 30, 24, 16, 14, 13, 11 (App. pp. 20—23) to the poorer. Only at 3 stations 1, 2 and 17 do *Astarte Banksii* and *A. borealis* occur as characteristic animals in larger quantities than *Abra alba* and *Macoma calcarea;* if these are specially marked E. a. all the E. stations in the Samsø Belt that are not R. M. (E. T.) may be comprised under E. a. b. c., and as in this irregular water, filled with shoals and channels, it has been impossible for me to find the exact distribution of the special E. b., E. c. and E. a. stations, I will throw them all together here and deal with them under the name of the E. a. b. c. stations.

Echinocardium is only absent in one of these 9 valuations, namely No. 20 in Sejrø Bay, which apparently lies outside though near the limit of this region, thus forming the transition to the white area on the Chart lying between the light blue and the green. The white area has not been properly valuated but now and then investigated in the Samsø Belt and must be considered as a poor region of the E. a. b. c. type without E.; the previously mentioned poor E. a. b. c. stations form the transition to these a. b. c. stations.

When dealing with the Kattegat already it was mentioned that *Macoma calcarea* occurred at a few stations, namely 32 and 34 in the south-western Kattegat, on the Chart they are marked by a red dot; we now understand that they are the outposts of the E. c. stations, otherwise only found in the Kattegat in the creek north of Kullen and the same may be said of St. 29 north-east of Hjaelm just lying where the south-western Kattegat meets with the Samsø Belt.

As may be seen from Chart No. I, the red curve marking the outer boun dary in depth of the E. v. stations stops near the entrance to Samsø Belt, where no stations that may be referred to E. v. have been found; in the deep parts reduced (E. T.) stations with or without R. M. or E. a. b. c. stations occur. At the stations in shallower water *Tellina fabula* and *Venus gallina* nowhere occurred as characteristic animals. In the quite shallow water marked by the green area on the Chart there is at some places, on the other haud, some resemblance to the shallower stations of the Kattegat, e. g. St. 29 near Fynshoved, where *Tellina tenuis* appears as characteristic animal accompanied by the usual sand-dwelling worms. On more sheltered places other animals occur as characteristic forms, as e. g. at stations 8, 28, 12, 18, 19 (App. pp. 23—25), which I intend to deal with later in the present paper.

In the Great Belt *Echinocardium* generally only goes down to north of Sprogø and the deep channel east of this island (see the Chart); at single stations a little south of this the young of this species are observed occasionally but they never become full-grown.

The three stations 2, 24 and 22 (App. pp. 25—26), as already mentioned, contain R. M. accompanied by a few mud-Bivalves with *Echinocardium* and a. b. c. as characteristic animals. The peculiar sea-slug *Phyllophorus pellucidus* occurs in no small quantities at all the three stations, which lie in the deepest channels, where the bottom is never quite soft but consists of gravel and pebbles mixed with clay and detritus.

North of Sprogø in deeper water lie Sts. 26, 25, 15, 13, 11, 9 (App. pp. 27—28) with E. communities. They can all be referred to the E. a. b. c. fauna but St. 9 is remarkbly poor. St. 4 (App. pp. 29) in the deep channel (30—35 meters) south-east of Sprogø is very much like the latter in spring; St. 6 (App. pp. 29—31) south of Sprogø in shallower water (22 meters) generally lacks E. but is rich in *Astarte*; samples have been taken there at 5 different times, thus showing the variations in time; St. 8 (App. p. 31) still shows some traces of the young *Nucula tenuis* and *Leda pernula* and in the autumn of the young E. We are now near the southern limit of E.; these stations and St. 21, in the deep channel east of Langeland (App. p. 32), thus form the transition to the following Sts. 5, 7, 17, 18, 27 and 28 (App. pp. 32—34) in shallower water, all of which are destitute of E. and also of *Cyprina* and all mud-Bivalves of the *Nucula* group; their characteristic animals are *Abra alba, Macoma calcarea* accompanied by *Ophioglypha albida, Solen pellucidus, Corbula gibba* and *Pectinaria Koreni;* they are therefore marked b. c. and must be considered as the remnants of the E. a. b. c. fauna living in deep water; where the bottom consists of black mud these b. c. stations may sometimes contain a very large quantity of animals per 1 m^2, especially *Abra alba.* All the stations in the Great Belt and Samsø Belt marked by red dots and lying in the white area of the Chart are of a similar kind, *Astarte* may however also be present there, so that the red dots always mean a. b. c.

In the Great Belt, as at certain places in Samsø Belt, we found at some stations R. M. (E. a. b. c.) at others E. a. b. c. and finally the poorer a. b. c.; we have still to mention the Great Belt stations on the green area of the Chart, which follows the coast everywhere and goes so deep into the fjords, that it meets with the freshwater or ends close to land. Sts. 1, 16, 19, 31 (App. pp. 34—36) lie in Nyborg Fjord. On studying the lists from these stations it is seen that the contents are very variable, *Macoma baltica* is the only species occurring in all of them though however in greatly varying quantities and often quite obscured by other species such as *Mytilus edulis, Mya arenaria, Cardium edule* or Gastropods as *Littorina littorea, Rissoa membranacea* and *R. inconspicua* and several others, but the Echinoderms are only represented by *Ophioglypha albida* and small *Asterias rubens.* Similar stations are found near Vresen outside Nyborg Fjord Nos. 3 and 30 (App. pp. 38—39) east and west of Langeland Nos. 20, 23 and 10 (App. pp. 38—39) and in the north-east of the Great Belt No. 12 (App. p. 36), but Nos. 29 a and b near Kerteminde (App. p. 37) with its *Tellina tenuis* and in autumn its *Mactra subtruncata* fry resemble some of the previously mentioned stations in Samsø Belt. St. 14 (App. p. 37) east of Fynshoved forms a transition to the shallower a. b. c. stations but owing to its *Littorina littorea* has also some resemblance to the above-mentioned.

Before dealing with the peculiar *Macoma baltica* community we must turn to some other waters where this species is richly represented and study its occurrence there. With one exception all the valuations in the Sealand archipelago (App. pp. 54—57) can be referred to this community, which will be designated the *Macoma* community and distinguished by the letter d. after *Macoma baltica*. St. 7 in the deep channel cutting into this water from the Great Belt is however a c. station (*M. calcarea*); St. 6 near the south point of this channel contains a number of *Abra alba* and some other small Bivalves from the b. c. region, but is a *Macoma* station and may also be marked by the letter d. All other stations are pure d. stations.

In the Little Belt (App. pp. 40—43) Nos. 6, 8, 10 are pure d. stations, 7 a poor station with some *M. calcarea*. Sts. 1, 2, 4 and 5 in the deep water are a. b. c. stations but No. 9 in the deep and narrow Little Belt, where there is a hard bottom and a flowing stream, is a peculiar mixture of a. b. c. stations and d. stations with *Modiolaria discors* as the characteristic animal. I have referred this station to the a. b. c. stations but a closer examination will certainly show that both communities occur here separately, pure d. communities are at any rate found in the fjords.

All the stations in the true Baltic (App. pp. 48—51) east of Gedser, with exception of 4, 5 and 10 where *Astarte* also occur, are pure d. stations.

In large areas of the western Baltic (App. pp. 43—47) between Gedser and Langeland only pure d. stations are found, e. g. Nos. 8, 9 and 13, but where the current is strongest, in deep water and in all the part lying west of Femern, we mostly find a. b. c. stations with *Cyprina* and *O. albida*, even young *Leda pernula* occurs at a single station; at several places down towards the north coast of Holstein *M. baltica* goes far out in the deep water, as indicated on the Chart by d.

All these waters, Little Belt, the western Baltic, Sealand archipelago and the true Baltic to Bornholm have only d stations near the coast and a. b. c. stations out in the deep water; in the Baltic proper the d. stations reach further out than ca. 40 meters, differing only in the deeper parts by the occurrence of *Astarte* besides the d. fauna. The Baltic may therefore be given a green colour right up to Finland with red dots at the places where *Astarte* occur, i. e. a little east of Bornholm; in the deepest parts of the Baltic no Bivalves at all are found (see the German investigations).

For the sake of completeness, it must be mentioned that in the Sound (App. pp. 51—54) R. M. (E. T.) stations Nos. 1 and 4 and (E. T.) station No. 9 are found in the deepest water, further an E. c. station No. 2., a. b. c. stations especially b. c. at Nos. 3 and 7 and pure d. stations at Nos. 5, 6 and 8 have been observed, thus representing all the faunas or communities found in the Belt Sea restricted within the narrow channel between Elsinore and Copenhagen.

Of special interest is No. 7 with traces of both *Axinus flexuosus* and *M. baltica*.

In the inner bight of the Isefjord (App. pp. 57—59) pure d. stations are found, but at Sts. 1 and 2 in the open fjord (Bredning) a kind of greatly reduced v. stations; the fauna seems here to be very variable from one year to another,

as for example in 1911 when *Ciona intestinalis* occurred in extraordinarily large quantities; *Ophioglypha texturata* is also present in rich numbers.

The Limfjord is a mixture of d. stations with or without b. and E. v. stations in the west; *Macoma baltica* itself is only found in the innermost creeks and near Thyborøn, but we shall postpone dealing further with this water till another occasion. —

Macoma baltica is thus found to be present in all the lists from the true Baltic, in several from the Belts but only in very few from the Kattegat.

On going through the lists it is easily seen, that *M. baltica* is sometimes the only Bivalve present and sometimes occurs accompanied by various others which often greatly exceed it in number and weight, e. g. *Mytilus edulis, Mya arenaria, Cardium edule, Scrobicularia plana.* Certain Gastropods especially *Littorina littorea, L. tenebrosa, Rissoa membranacea* and *R. inconspicua, Acera bullata, Neritina fluviatilis, Hydrobia* etc. may also be present in large quantities or totally absent; almost the same is the case with *O. albida* and small *Asterias rubens*, the only Echinoderms occurring together with *M. baltica*, and certain worms, *Arenicola marina, Aricia armiger, Terebellides Strømii* etc.

From the above one might obtain the impression that the limits of the *Macoma baltica* community are not very sharply marked compared with most of the other communities, but this is certainly not the case. This community fills up most of the small Danish fjords and more sheltered waters along the coasts out to a depth of 10—12 meters and is the community we know best of all, because it often lies quite open before our eyes in these shallow waters, which are so transparent that everything on the bottom can be seen and at low water even permits of a direct examination. In this way we know of its great variations due to the nature of the bottom, sandy, stony, muddy or soft etc., its varying plant-cover, its greater or less exposure to currents and the swell, the varying conditions of temperature and salinity under which it may thrive and much more; its range of distribution reaches from hard bottom with white sand to stony bottom with soft shifting mud, from the Zostera regions to places quite destitute of any higher vegetation; it is found at places where the salinity varies from ca. 0,5 up to 2—3‰, now in flowing waters, now in waters with no current at all; thus, it is no wonder that its fauna varies at the different places and is rich in different facies; much more it has to be wondered, that there are some species common to all these localties, namely, first and foremost *Macoma baltica;* but also the other animals, which do not go down into or out on other regions, e. g. on the *Venus* stations with *Echinocardium* in the Kattegat, or on the *Abra alba, Macoma calcarea* or *Astarte* stations in the Belts, must be reckoned as the characteristic animals of this community; they do not belong to all the different facies of this community but to the community as a whole; as such animals may be mentioned all the above bivalves and Gastropods and a large quantity of less common animals. This community, which has been named the *Macoma* community from *M. baltica,* has so often been referred to by Scandinavian authors, that it must be considered as being generally recognised; *Macoma baltica* has however never been mentioned as its special, characteristic animal, probably due to the fact that the community has mostly been examined at places where it is laid bare by the strong ebb-tide, in Scandi-

navia along the rocky coasts where this Mollusc naturally is absent, as it requires a loose bottom with sand or mud to be able to thrive. But just as the rocks exclude the occurrence of animals belonging to the soft sea-bottom, we cannot expect to find in the latter animals such as *Balanus* and certain *Patellidea* always occurring among rocks or stones; other forms such as *Rissoa, Littorina,* certain *Patellidae*, *Actiniae*, *Crustacea* etc. are dependent on the vegetation (*Zostera*, *Laminaria*, other algae). *Mytilus* prefers to attach itself to fixed objects, but requires very little once it is attached; it may occur in colonies even on very soft bottom but its distribution then becomes rather scattered and local.

I would therefore propose, that in the *Macoma* region we can distinguish between an In-fanna, which is connected with the ordinary, level, uniform sea-bottom, whether this consists of sand or mud, the characteristic animal of which is first and foremost *Macoma baltica*, though this on the quite open coasts with heavy swell and almost pure, hard sand is replaced by *Tellina tenuis* (see some quite shallow stations mentioned previously under the Kattegat) and various On-faunas (epifaunas), which occur in connection with such objects on the sea-bottom as stones, piles, shells, rocks or plants; the occurrence of such epifaunas is dependent on the distribution of these objects in the bottom and they therefore often appear more scattered and accidentally, especially where the fixed objects are so sparse as on the sandy Danish coasts. It is thus easier to chart the In-fauna than the On-fauna. —

In the other animal communities in deeper water an epifauna generally plays a much less important role; the strong vegetation gradually disappears altogether and the solid objects, i. e. the stones, decrease in number; but in the flowing water round Samsø and partly also near the shoals of the Great Belt, e. g. on both sides of Sprogø, the bottom is hard in the deep water, where *Echinocardium* etc. is living and in these flowing waters is found a special epifauna, previously mentioned as the rich Echinoderms with Modiola.

In the deeper waters of the Kattegat we hardly anywhere find a widely distributed On-fauna, the only places might be the deeper waters of the eastern Kattegat, where there is a hard sandy bottom with stones and where *Crania anomala* and *Scalpellum* occur; *Crania* was not present in these valuations but was taken during the »Hauch's« cruises in earlier years; in other deep waters we may quite well meet with such deep On-faunas. (See Appelløf on *Paragorgia* and deep-water corals). —

A special local fauna, which perhaps can neither be described as an In-fauna nor as an On-fauna, is formed by the Molluscs *Teredo*, *Pholas*, *Zirphaea* living on firm soil either in glacial clay, limestone or wood; their distribution in Denmark is however so slight, that they are hardly of any great importance as characteristic animals; the same is the case with *Limnoria terebrans*. These animals have to be referred to the Macoma community, though *Pholas* is found in large quantities in firm clay bottom in the North Sea off the Thyborøn Channel and in the deep water of the narrow Little Belt.

A true rocky bottom is not found in the Danish waters, but at several places firm clay masses with stones slope steeply down towards deep water, enabling a fauna related to the one described from Scandinavia to thrive on it,

namely an On-fauna consisting of Chitons, *Actiniae*, *Balani* etc. In the narrow Little Belt (e. g. on the harbour moles) this fauna is also met with; it cannot be examined by means of a bottom-sampler and being besides of such local and scarce occurrence has not been included in the present investigations; it certainly also belongs to the *Macoma* region. —

It has been stated above, that many Bivalves as well as certain Gastropods from the *Macoma* community keep to their own regions and do not go out to the *Venus* stations or the *Turritella* area.*) The deeper community in the Belt Sea bordering on the *Macoma* community is the *Abra alba* or *Astarte* community; on the borders, but only there a mixture of the species takes place. From the tables it is seen that this only happens comparatively seldom, except in the Baltic where each of these two communities tries to dominate. Further north the limits are remarkably distinct, though not with regard to the worms and Echinoderms; *Arenicola* and *Aricia armiger* reach out to the *Venus* stations in the Kattegat, *Terrebellides Strømii* out to the a. b. c. stations in Samsø Belt and Great Belt and *Ophioglypha albida* goes out into the deepest Skagerrak, while *Asterias rubens* reaches the *Brissopsis* stations, at any rate as full-grown individuals.

It is thus seen, that the distribution of all the members in one and the same community is not determined by the same outer conditions; some species spread from the western Baltic to the deep Skagerrak, thus going through all grades of varying conditions and through almost all animal communities, whereas others occur within restricted limits; some species are therefore better suited to characterize within narrow limits than others. —

A glance at Chart I shows that there is a distinctly marked order in the distribution of the animal communities characterized here, and that the distribution is in good agrement with many things known previously, e. g. the occurrence of fishes,**) nature of the bottom-soil (see Chart II), salinity etc.; we may reasonably draw the conclusion from this, that the characterization carried out with regard to these communities rests on a sound basis, even though it is only broadly outlined by means of few, but in quantity very important species of animals alone (the characteristic animals).

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*) In the Kattegat the various Gastropods and other animals connected with plants reach out to the lower Venus stations as a kind of epifauna of the *Macoma* community, as far as the plants occur. This condition as well as many details regarding the epifauna of the *Macoma* community has not as yet been made the object of a close examination.

**) The region of the *Macoma* community is thus almost the same as that of the yellow eel (except in the Baltic proper); and other species of fish, e. g. *Zoarces viviparus*, certain Sygnathids, certain Gobies etc. are connected with certain of its variants. In the *Echinocardium* region and the a. b. c. stations without E. plaice and dab occur in large quantities, while in the *Brissopsis* region besides the above-mentioned also haddock and *Myxine* are present in larger or smaller numbers. Owing to the migratory propensities of the fishes these are however not so absolutely restricted to certain animal communities of the bottom and especially their distribution varies at different ages, but broadly outlined a tendency to seek certain animal commities of the sea-bottom may be traced in the fishes.

The dredge, the principal apparatus used by naturalists from the time of *Marsigli* and *Donati* ca. 1750 and *O. F. Müller* 1773 for their investigations of the animal and plant life of the sea-bottom, is in many respects an implement of great use, but it requires to be supplemented by other apparatus, partly because it almost always gives more or less false pictures of the animal life of the sea-bottom partly because it does not give any idea as to the quantity of animal life there. The dredge used for scientific purposes is a transformed oyster-dredge; the object of the oyster-dredge is to capture the greatest quantity of oysters in the shortest possible time and to avoid taking many other things and animals as much as possible; it must be said that it serves its purpose excellently, though from a study of its operations on such a large field as the Limfjord oyster banks we can see, that it generally only takes 10—12% of the full-grown oysters on a bank, even if towed over the bank for several days. The dredge therefore gives very little information about the true quantity of the oysters on a bank, but it tells us if the bottom is suited for the use of the dredge or not; and this is the main purpose of the oyster dredge; if there are many scattered Zostera leaves on the bottom it is often of no use at all to use the dredge, as but few oysters will be obtained.

On soft bottom the oyster dredge can only be used when the meshes are as large as ca. 6—8 cm, so that small shells and mud pass through and the oysters are so to speak sieved from the mud in dredging; if, namely, the holes of the meshes are small in order to capture smaller animals, the dredge at once fills with mud and we might as well use a bucket, for the dredge fills after towing $^1/_2$—1 meter along the bottom and thus is only in operation this short distance. I have in reality tried this myself to prove the truth of this statement. Even if the dredge caught everything on its way in and on the sea-bottom, there is another drawback, namely, that it is difficult to estimate how long a distance it has been towed across the sea-bottom; in most cases this presents so many practical difficulties, that all experiments in this direction must generally be given up.

In order to make as close a comparison as possible between the capacity of the bottom-sampler and the dredge, I have sometimes had two buoys thrown out at a certain distance from each other under favourable conditions of weather and current and both apparatus have been used there. The result is seen from the table p. 19.

The bag of the dredge used consisted of small iron rings ca. 1 cm. in diameter, a form of dredge which has proved to be the most practical shape for the different purposes, though naturally not for the capture of quite small animals. From the width of the dredge and the distance between the buoys the area worked over by the dredge was estimated at ca. 75 m^2, whereas 5 samples of 0,2 m^2 were taken up with the bottom-sampler, thus 1 m^2 altogether and 5 others of 0,1 m^2 thus 0,5 m^2 altogether; it is thus seen, that the dredge fished over areas that were 75 and 150 times larger respectively than those of the bottom-sampler.

The contents of the two apparatus are indicated in the table pg. 19 and in one column an estimate is given of the amount of ordinary animals on 75 m^2, which would have been taken by the bottom-sampler if it had been used over the whole area. If the bottom-sampler had been used over the whole area, it would

Comparison of yields of bottom-sampler and dredge in the southern Kattegat.

N. of Raageleje. 22 m. 15' August 1912.
1st experiment.

Bottom: sand and detritus.	Bottom-sampler. 5 × 0,2 m² = 1 m²	Calculated quantity of animals on 75 m².	3 minutes' dredging = c. 75 m².
Macoma calcarea	1	75	2
Mactra solida			1
Cyprina islandica	6	450	
» » juv.			2
Axinus flexuosus	2	150	
Nucula tenuis	5	375	
Neptunea antiqua			5
Buccinum undatum			5
Natica pulchella			1
Aporrhais pes pelecani			15
Cylichna cylindracea	1	75	
Aphrodite aculeata	1	75	
Lepidonotus squamatus			1
Aricia armiger	c. 2	c. 150	
Nephthys sp.	c. 20	c. 1500	
Pectinaria auricoma			1
Amphitrite cirrata			1
Sabellidæ	2	150	
Amphiura filiformis	c. 100	c. 7500	
Ophioglypha albida	2	150	132
» texturata			1
Astropecten Mülleri			1
Solaster papposus			1
Asterias rubens			1
Echinocardium cordatum	5	525	49
Strongyloc. drøbakiensis			74
Eupagurus Bernhardus			18
	c. 149	c. 11175	311
			c. 3 %

N. of Raageleje. 28 m. 15' August 1912.
2nd experiment.

Bottom: sandy clay with tubes of Gammarids.	Bottom-sampler. 5 × 0,1 m² = 0,5 m².	Calculated quantity of animals on 75 m².	3 minutes' dredging = c. 75 m².
Abra nitida	1	150	
Venus ovata			3
Cyprina islandica	1	150	
Cardium fasciatum	1	150	
Leda minuta	7	1050	2
Nucula nitida	1	150	5
Lima Loscombii	2	300	1
Pecten septemradiatus			3
» sp.			1
Buccinum undatum			5
Natica catena			3
Aporrhais pes pelecani	1	150	24
Dentalium entalis			5
Chiton sp.			many
Aphrodite aculeata			10
Glycera sp.	c. 10	c. 1500	
Nephthys sp.	c. 10	c. 1500	a few
Eumenia crassa			1
Maldanidæ	many	many	
Pomatoceros			many
Nemertini			a few
Ophiopholis aculeata			14
Amphiura Chiajei	1	150	1
» filiformis	1	150	1
Ophioglypha albida	7	1050	210
» robusta	14	2100	15
Strongyloc. drøbakiensis			24
Haploops tubicola	many	many	many
Eupagurus Bernhardus			11
Hippolyte sp.			1
	c. 57	c. 8550	340
			c. 4 %

certainly also have captured most of the larger, »rarer« animals, which were taken by the dredge. As will be seen, the dredge has only taken 3 to 4 % of the number of animals, which according to the bottom-sampler must have been within the area where the dredge was used; but as the former apparatus catches so many small animals which are passed over by the latter, we are hardly able to judge correctly the overspringing powers of the dredge. From the first experiment it is seen how many large *Cyprina, Macoma calcarea, Sabellids,* other worms and *Echinocardium* there have been, and how few or none at all of these large animals that have been captured by the dredge; and if we turn to the other experiment we see, how many *Cyprina, Aporrhais, Ophioglypha albida*, to say nothing of the smaller Ophiurids have been passed over by the dredge. On the other hand, this apparatus has caught several animals that have not been taken by the bottom-sampler at all, such as *Buccinum, Fusus, S. drøbakiensis,* large Asterids and *Eupagurus Bernhardus,* all rapacious animals and other large animals lying above the sea-bottom, but the number of which, to judge from the results of the dredging, is not so large that they occur in each $^1/_2$ or 1 m².

In the 2nd experiment the dredge has evidently, to judge from the many specimens of *Ophiopholis aculeata, Pomatoceros, Chiton,* been towed over a small community of epifauna with rich Echinoderms, which the bottom-sampler has not met with.

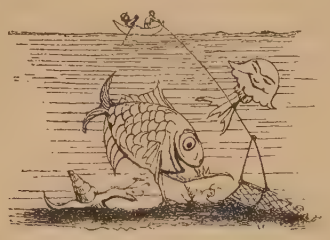
The dredge has a special capacity for catching *Strongylocentrotus drøbakiensis*; it has often roused my astonishment, that if working at certain places with the bottom-sampler, say for half a day, almost every single sample of 0,1 m² taken up contains *Echinocardium*, whereas at the same place the dredge constantly fills with *Str. drøbakiensis* and only contains few or no *Echinocardium* at all. The explanation is, that the dredge mainly catches the animals lying loosely above the bottom, as for example *Str. drøbakiensis*, but fails to take almost all the animals living on muddy or sandy bottom which bury themselves down therein, for example *Echinocardium*, many worms and Bivalves; it is just among these that we generally find the ccmmonest and most regularly distributed animals, i. e. the characteristic animals.

I could give and ought perhaps to give still more proofs of the inefficiency of the dredge; but I am of opinion that most people who have used dredges will easily understand its incapability of giving quantitative representations of the animal life as a whole, and its preference for catching certain species, thus always giving us f a l s e i d e a s of the animal life of the seabottom.

I believe, in reality, that everyone who has used the dredge a great deal must have felt dissatisfaction with its shortcomings and mode of working on the whole, a dissatisfaction only requiring a small stimulus to break out in full force and which will certainly do so as soon as we get a better apparatus to place beside it; but, as already mentioned, the dredge has some good qualities, for example its special ability for catching the large, more scattered animals lying above the sea-bottom. It is a well-known fact and need therefore only be hinted at here, that there also exist dredging apparatus, the object of which is to skim the surface and catch the smaller animals.

To judge from *Edward Forbes'* vignette in his own and *Godwin Austens'*

famous work, *The European Seas* 1859 p. VIII, reproduced here, this author does not seem to have been satisfied with the dredge and in a paper dealing with the results of the Ingolf Expedition Prof. *H. F. Jungersen* states, that a dredging ship



may be compared with an air-ship towing a dredge over Copenhagen, catching a policeman in one street and a perambulator in another; and from these it draws conclusions as to the whole population of the town.

The dredge has evidently been used as a sort of necessary evil because nothing better was known, either to replace it or even to use alongside it and I am quite willing to admit, that it has rendered great service to science, but it would certainly improve by competition; I hope the bottom-sampler will become a keen competitor to it, also out in the depths of the sea.

So much is certain, quite an astonishing quantity of common animals have been taken with the bottom-sampler in the Danish waters out to a depth of ca. 300 meters, compared with the number of similar animals obtained by means of dredges of various constructions.

As in the plankton investigations, where by means of nets of various fineness and size we may at a certain place catch many different kinds of plankton, we are also able by means of apparatus of various sizes and construction to catch many different kinds of bottom-animals; with the bottom-sampler we obtain the common and generally distributed animals in or at the sea-bottom, with the dredge we get the larger and rarer animals, and finally with the large fishing-nets the still rarer and larger.

All who have seen the large quantities of mud, often with great masses of animals contained therein, that are taken up by the bottom-sampler will easily understand that a dredge cannot sift all the bottom-material on its way; 1 or 2 samples of 0,1 m^2 taken up with the first-named apparatus will fill the bag of the common dredge as much as this can be filled; the dredge ought therefore to be full when towed one meter or so over the bottom, and this is generally the case on soft bottom. The animals of the dredge are therefore in general not comparable with one another, neither in quantity nor quality.

The question is now, how are we to know that the contents of the bottom-sampler are comparable, and how much can we rely upon its giving a true picture of the animal life in the sea-bottom. I shall endeavour to answer this question as satisfactorily as possible. First of all I may refer to the earlier tables of the 100 stations in Thisted Bredning (see Report XX, 1911), where the numbers obtained by means of the bottom-sampler with regard to the occurrence of the most common species seem to lie within reasonable limits of error; they would have been still

more correct, had the Bredning been divided into several parts according to the natural conditions and fauna. As can be seen, the depth gradually decreases from 13 to 4 meters at Sts. 1 to 100 and also the bottom and fauna change. With regard to the fauna this was unknown to me beforehand, and I took the whole area as one. The results obtained would, as already mentioned, have been still more correct if we had split up the district into areas.

The characteristic animals are *Abra alba, Solen pellucidus, Mya truncata, Nucula nitida, Philine aperta, Pectinaria Koreni, Ophioglypha texturata;* and the quantities in which they occur may at any time and with fairly great accuracy be determined by means of the given numbers. That some of the above-mentioned species do not occur every year or at all seasons of the year as characteristic animals, but vary considerably in occurrence and are at certain times absent altogether is quite a different matter, which is of great importance for other questions but has nothing to do with the accuracy of the bottom-sampler. This is so great that changes in the fauna have been indicated by its means, which could never have been done with the dredge, since we never know if the latter fails to catch these smaller animals or not. In the middle parts of Thisted Bredning the bottom is only at places rather stony, and in these and in the shallowest parts mostly consists of soft slay and loose sand, thu seminently suited for the use of the bottom-sampler.

Since 1911 I have constructed other bottom-samplers that are so heavy and dig so deeply, that they may also be used on hard sand-bottom, even where small stones occur and also at places with considerable vegetation (Zostera); but where the bottom is too stony or consists only of stones or rocks the bottom-sampler is quite useless for quantitative purposes.

In Denmark we have only comparatively few areas with such hard bottom-soil, and mostly in shallow water; they generally seem to contain very few of the more important characteristic animals, though there are naturally exceptions to this rule. It has only happened very seldom, that I have been obliged to give up the valuation of the larger areas owing to their stony bottom; sometimes a sample is vitiated, for example when stones or hard shells get jammed into the bottom-sampler so that this cannot close. These samples are neglected and others more successful have to be taken instead.

How far we are able in the valuations to carry the statistical determination of the mass of animals on the areas occupied by the same community is a separate question and is mostly dependent on the question of production, but that the bottom-sampler gives pictures of the animal life that can be recognised again by other investigators and at other times also outside the Limfjord, is what I shall endeavour to show in the following.

In the Great Belt St. 6 (App. pp. 29—31) east of Vresen broom at a depth of 22—23 meters and almost off the same land-marks has been investigated 5 times, in April and October 1911 and in April, September and October 1912. It has naturally been impossible to determine the position of the ship more exactly than within some 400—800 meters, as it always drifts a shorter or longer way with the current while the samples are being taken; these have therefore not been taken at exactly the same geographical spot, nor was this the object, for the result

would have been, that too few animals would have been obtained; but in sea-language they are from the same place and ought therefore to be the same in faunistic character. The bottom has no vegetation of any importance and consists of sand and detritus interspersed with stones as large as nuts, which place no hindrance to the work of the bottom-sampler.

The first time at St. 6a the rough weight of the total quantity of animals was 125 gms., at St. 6b 307, at 6c 283, at 6d 470, at 6e 485 gms.; I do not quite understand what this increase in quantity may mean; both the two lowest values 125 and 283 gms. are spring determinations, which are generally lower than the autumn determinations owing to the increase of animals during the good season of the year. The fairly large variation in rough weight may either mean that the quantity of animals varies even at adjacent places or that our first bottom-samplers of 1911 did not go deep enough; suggestive of this is the fact, that *Cyprina islandica*, which is very difficult to take by means of a light bottom-sampler, should be so feebly represented at Sts. 6a and 6b; on deducting the weight of this Mollusc we obtain the following numbers; 51, 219, 155, 250, 287, gms.; 51 and 155 are both from the spring; the first is certainly rather low, probably due to the fact, that the fauna has here been less luxuriant than at the other adjacent places, but the three values from the autumn: 219, 250 and 287 are in good agreement and 155 from the spring may very well be due to the smaller number of animals occurring in spring.

The characteristic animals of all 5 valuations are the following: *Macoma calcarea*, the *Astarte, Cyprina, Ophioglypha, Ascidiae* and in two of the autumn samples some local *Abra alba* and some Gammarids and *Diastylis* of a very low weight; in 6e *Modiola modiolus* amounts to 18,5 gms.; *Nephthys* has not been separated as species and therefore cannot be judged of here, though it is in good agreement in all the four last valuations. I shall not deal any further with various small differences and agreements, as the main thing is not to lose oneself in details too much in these investigations; the lists in the Appendix give besides all the information required.

I have mentioned the above 5 valuations from »the same place« but taken at different times, in order to show that viewed on a large scale the bottom-sampler really gives the same faunistic pictures wherever it is used, but also to show that we should not pay too much attention to the occurrence especially of younger animals, as these are evidently only present at certain times, e. g. young *Echinocardium*, *Abra alba*, *Leda pernula* and *minuta*, nor to the animals living so scattered that they are not always taken by the bottom-sampler, e. g. *Buccinum*, *Asteria rubens*; lastly, we are not to draw any conclusions from the small Crustacea and other animals whose weight is small, unless they are present in specially large quantities.

It has been my aim here to show the method as it is worked practically with its defects and advantages and in this way it has proved, that the same characteristic animals appear at all times; the 3 *Astarte* species even always show the same relative frequency, *Astarte Banksii* has the richest occurrence, then comes *A. borealis* and lastly *A. elliptica*, but in weight things are quite different.

How difficult it may be to determine the quantity of animals in areas

containing the capricious rich Echinodern community with *Modiola modiolus*, will be seen from the lists 2a, b. c. (App. pp. 25 and 26) off Knudshoved near Nyborg in the Great Belt. On April 7th 1911 I had found this community (2a), for brevity's sake marked R. M., near Knudshoved where it occurred in large quantities and later on, namely in May, tried to find it again, in order to demonstrate it to Prof. *Hensen* from Kiel, who was onboard to become acquainted with the method of valuation. 2b and c show these experiments. I certainly succeeded in finding the R. M. community again with almost the same characteristic animals, but the weight, which in April was 3804 gms. per 1 m.^{2}, was now down to 141 and 1350 gms.

Referring to p. 10 above, where the R. M. communities have been dealt with in detail, I may explain here that the lists 2a. b. c. must be considered as representing a double fauna, half of which is the usual fauna of the Belt where *Astarte*, *Macoma calcarea*, partly also *Abra alba* and *Ophioglypha albida* occur as characteristic animals, the other half being the On-fauna containing R. M. animals, i. e. *Modiola*, *Ophiopholis*, *O. robusta*, *Phyllophorus*, *Psolus*, *Balani*, *Ascidians*, *Lepidonotus*, *Trophonia*, and of »rarer« animals the large *Asteridæ* and various others as characteristic animals.

I have mentioned previously, that by means of different apparatus, e. g. bottom-sampler, dredge, large fishing apparatus of nets, we may obtain different kinds of bottom-animals at one and the same place, in other words, that by means of a single special apparatus we can get no complete representation of all the animal life at a certain place; and if we want to obtain the true quantities of all species this is by no means possible even if we use all the apparatus known; for this purpose numerous and combined investigations are required such as have been started by me in the Limfjord (Report XX) by means of diving experiments, marking of fishes, statistics, large bottom-samplers made for capturing the rarer, larger species etc. Investigations like these can only be carried out within certain restricted regions and even there the methods need improvement, but if content with obtaining a summary or oversight of the most common species of animals, i. e. those having the greatest weight and numbers, in other words the characteristic animals, the bottom-sampler will suffice; in spite of its deficiencies it gives information concerning by far the greater number of the common animals living in or on the bottom, by comparison with which the rarer animals, rapacious animals and fishes are of very little importance.

As already mentioned, the catching capacity of the bottom-sampler is restricted. I shall deal here a little further with this question.

It has already been pointed out that the bottom-samplers do not work equally well on all kinds of bottom; stones and rocks may render all quantitative determinations impossible and even on hard sandy bottom a heavy, deeply digging bottom-sampler is required, if good results are to be obtained. During the past year with the assistance of engineer Mr. *Axel Møller* I have constructed a new bottom-sampler (see Plate I, to the right) to be used on sandy bottom instead of the older one; with its heavy weighit is able to dig several cm down into hard sand. It is not closed at the top, since at present I do not consider it to be of any importance if some of the smaller animals, e. g. Crustacea, escape; they generally do not weigh much; the apparatus can quite well be closed however by

means of a lid of wire. This kind of bottom-sampler has been of great use on stations with hard sandy bottom; to be able to dig better it should span over 0.2 m². I do not think it necessary to give a more detailed description of its construction here, as this may quite well be studied from the figure. With this bottom-sampler however we are as a rule unable to obtain the large *Mya arenaria*, *Arenicola* and similar animals living deep down in the sand. That *Arenicola* lives out in depths of 12—14 meters and probably still deeper in the Kattegat I have learnt from the examination of the stomachs of plaice and from information given me by Switzer's Diving Company, to which I would offer my best thanks here for their helpful assistance.

Animals which live deep down in the older, firm clay-layers, e. g. *Pholas*, *Zirphaea* etc., are only occasionally taken in the bottom-sampler, but all these difficulties concern as a rule the valuation of the shallowest parts of the sea, which owing to their many irregularities are in any case difficult to valuate quantitatively to an accurate extent. The Zostera also places some hindrances in the way of the valuation, though not so great; it generally means that too small quantities of animals are obtained, but how great the errors are in the long run I am not at present able to say. The Zostera is at any rate taken in great quantities by the bottom-sampler, but hardly all the animals sitting loosely on it.

On the whole this apparatus never gives too large quantities of animals, its shortcomings lie rather in giving too small.

Many swiftly moving animals easily escape the bottom-sampler and but few fish are taken; but *Amphioxus*, which is very common at certain places and plays a not unimportant role as fish-food, is generally taken in quantities by the bottom-sampler.

Another drawback of the bottom-sampler method, shared in common with the dredge, lies in the necessary sifting of the material; if we are to sieve all the bottom material hauled up in a moderate space of time, the smallest holes of the sieve must not be too small, they must be larger for sand than for clay-bottom, enabling the sand grains to pass through; the smallest square holes I have found practical are ca. $1^3/_4$—$1^1/_2$ mm, the animals able to pass through these are therefore generally lost and at certain places and seasons of the year I have seen large quantities of Bivalve fry, the presence of which was ascertained by means of still finer sieves, pass through in such numbers that they would have been of quantitative importance; just a few weeks later they had grown so much, that they were no longer able to pass through the meshes.

We have now come to another side of the question of valuation, namely, the varying quantities of animals at the different times of the year, this being more a question of production than one of the general character of the animal stock; for the determination of the latter I do not think that much of the quantity is lost by using sieves; this matter has often been examined and I have been astonished to see, that the fry generally only occur in large quantities in quite shallow water 4—6 meters deep; other conditions may probably prevail in the deeper waters outside Denmark; I have reason to think it is so, but out there very fine sieves can always be used, as the bottom generally consists of fine clay.

At places where the *Amphiurae* live in such quantities that they form a dense net over the sea-bottom, as was the case on the clayish parts of the Kattegat (see Plate 2), but very little of the tiny fry will be able to develop; *Amphiura* lies with the body and most of the arms deep down in the clay, but always with the tips of one or more arms stretched out ready to finger any object that comes near and if wanted to draw it down into the clay where it is swallowed. I have seen this in my aquaria. For some reason or other the *Turritella* fry and the young of a few other species are able to escape them and are found in quantities together with *Amphiura*, but I am inclined to believe, that the latter eliminate the fry of almost all Molluscs found inside this region, for both outside the *Amphiura* region (e. g. St. 18 in the Skagerrak) and inside this on the *Venus* stations the same species of Molluscs occur in rich quantities.

Though we see, therefore, that the bottom-sampler has its limitations like all the finest plankton nets and other fishing apparatus, I think that as a rule it gives good information regarding the quantity of the common, characteristic animals; but it depends upon the presence of more or less characteristic animals whether we are able by means of this apparatus to get information about a larger or smaller part of the whole mass of the bottom-fauna. At the places investigated such characteristic animals seemed as a rule to be present, but, as already said, their presence or absence is the foundation stone for the whole method. If all the species of a certain place were equally characteristic or equally uncharacteristic, we should have to keep to the whole list of species, whereby all details become obscured and we see no end, for we hardly ever know all the species of animals living at a certain place.

Zoogeographers have always felt the difficulty of working with lists of species, even though as complete as possible and even for single groups, and have therefore chosen characteristic species amongst these according as their distribution coincides with the areas, provinces, dephts, previously, marked off in accordance with different outer conditions; much information naturally is gained by using this method, especially if we are dealing with large areas where certain species are either absent altogether or present; but as a rule this method cannot be used. It would be too vague a characterization if when speaking of the species we know best, namely man, we said that in Greenland and Denmark both Greenlanders and Danes are found, and both lands therefore belong to the same »human« region; it is clear at once, that a quantitative determination is also required. It is true that man is a species, who by mere »chance« has spread over vast areas of the globe but the same is the case with the marine animals on no small scale; in order to discover what is the normal, most of what is due to chance must be left out of consideration; it is by no means easy to draw the right limits here, but the most commonly distributed species and those occurring in the largest quantities and numbers seem to me to afford the firmest basis to be obtained.

I may now end this section on the limitations of the bottom-sampler with emphasizing an advantage which this apparatus has above others, namely, that it is better suited for the investigation of a certain definite spot of the bottom and by using it we avoid mixing different animal communities. If we are able to keep

our boat still, we can examine one single community as long as we wish; in using the dredge, on the other hand, we must tow it over a greater or smaller distance and may, therefore, at places where the bottom or depth suddenly changes, easily mix in a haul one or two animal communities. In the Scandinavian fjords this plays an important role and adds to the great advantages already possessed by the bottom-sampler as compared with the dredge.

The whole method of determining the number and weight of each species on the sea-bottom greatly resembles *Hensen's* plankton method in principle, but on the sea-bottom the organisms composing the mass are not so small as in the plankton and it is therefore much easier to carry out the method practically; the individuals of each single species may be separated from the others by means of forceps, and counted and weighed by themselves, and as the generations of these animals do not follow each other so quickly like those of the small plankton organisms, the question of production is also simplified; but in both cases the daily consumption of the organism places great hindrances in the way of the determination of the yearly production.

The above-mentioned characteristic animals are, if not quite identical, at any rate closely related to the so-called leading fossils of the geologists, i. e. the animals that are always found in or are characteristic of certain layers, whose presence is easily proved even in small parts of geological layers and whose connection with the animals of other layers is just what we wish to discover. It has been much easier for the geologists than for the zoologists to effect a quantitative examination of the sea-bottom, that is the fossilized sea-bottom whose fauna they have so-to-speak before their eyes, at least as far as this has been preserved, and this is just the case with Echinoderms aud Molluscs more than with all the other animals of the sea owing to their hard shells. The importance of the leading fossils to geology is long since an established fact and the fossils appear to be very closely related to our characteristic animals, being certain, generally distributed, common and therefore characteristic species of animals, which more than all others may be used to mark and indicate the whole fauna at a certain place; up to the present time we have not known »leading fossils« in our seas, as these have been concealed by the dredge.*)

It should not be thought that a very accurate eye, great experience or a very intimate knowledge is required for discovering and separating the above-

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*) It is not only in geology that we find a parallel to these communities founded on the characteristic animals, the botanists have long ago introduced the method, e. g. meadow, heath, steppe, moor, wood etc. Of the botanists of to day *Warming* has called attention to the importance of the communities, whilst *Ravnkiaer* endeavours in his practical investigations to use scientific statistical basis for the »life forms«, just as I do for my characteristic animals. Of the older authors *Lorenz* in his work on the Gulf of Quarnero is probably the one who has carried out the most comprehensive characterization by means of the common animals. He started as a botanist by using the methods on dry land, and later on tried the same methods also for the sea. Owing to the shortcomings of the dredge for this kind of work, the method however never proved quite a success. In his recent work on »die Plagefenn« of 1912 *Fr. Dahl* has used similar methods for the determination of the »Boden Biocoenosen« and has already for a long time used the quantitative method, but this offers much greater difficulties to the zoologist than the botanist especially on land.

mentioned animal communities in the Danish waters (see Plates 2—6); we can see at once, even on using the dredge, that there is a great difference between them but their characterization has been found difficult and further we have known too little about the quantity of common animals on each m.²

Naturalists like *Appelløf* and *Lønnberg* have found that there is a difference between the »brackish-water fauna« in the Sound and the »marine animals« and that within these there exist many different groups. In the works of both authors I now recognize the vague outlines of several of my distinctly characterized communities. In *Appelløf* I find something which corresponds to our *Macoma* communities, to the shallow *Venus* stations on sandy bottom, to the rich Echinoderms with *Modiola*, to the deeper *Brissopsis* stations, but he goes on to deal with faunas in deeper water, which we do not know from the Kattegat; he does not use *Macoma baltica*, *Abra alba*, *Macoma calcarea*, *Astarte*, *Echinocardium*, *Turritella terebra* or *Amphiura* as characteristic animals, several of them he does not even mention; but as he only carried out his investigations by means of the dredge, he has undoubtedly reached as far as he was able to do by means of this apparatus. His excellent work is an additional inducement to use the bottom-sampler where this can be used, in order to further ascertain the correctness of what we know already and I have every reason to expect, that this can be used in all the large regions investigated by him, that is, everywhere in the sea.

Not until I had appreciated the difference between the In-fauna and On-fauna did I understand the double nature of the fauna found at so many places; these two ideas will undoubtedly prove of great importance in more extended investigations; among the plants on land we find similar conditions.

I may recall that many other naturalists, *Lorenz*, *E. Forbes* etc. have endeavoured to separate the littoral region as well as the deeper waters into zones; at many places where the ebbtide is strong, it has been possible to examine the bottom directly by the naked eye and within recent times investigations have been carried out in this way (France). At first it was thought possible to determine these zones by the depth alone or by a characterization of the vegetation and bottom conditions *(Pruvôt)*, but though much has been gained along these lines we do not hereby come to the kernel of the matter, namely, the occurrence of the generally distributed animals, which alone can tell us where a certain animal community belongs, even though the depth and outer conditions may vary.

Not even my own previous, laborious charting of all the different species in the Kattegat (»Hauch«) answered my purpose, partly because in this way I lost the general perspective and partly because dredges were used and all determinations of quantity had to be given up; but I had clearly realized the enormous difference between the various communities and have ever since sought for a method of characterizing the communities in a more synoptic manner that could be easily understood by others. I am now of opinion that I have found it (through the characteristic animals) and hope that it may be used on as large a scale as possible in order that by its means we may obtain some firm basis of support in this difficult matter, namely, the description of the animal life on and in the sea-bottom. If we proceed in the same way as hitherto no results will ever be obtained, not even with regard to the single species, for though much is known

about their distribution it is generally erroneously summed up; if a species has been found often in certain waters this is only spoken of as »common on the Norwegian coasts«, »found everywhere in these waters«, even though it may be absent within large areas there; if in Danish waters a species has been found living in a depth of 10—30 meters and not deeper, whilst the same species occurs for example near the Shetland Isles in a depth of 100—400 meters it is spoken of as follows; »the species is found in West Europe and lives in depths of from 10—400 meters«, whereas in reality it does not occur at all in deep water in Denmark nor in shallow water near the Shetland Isles, owing to the fact that the hard bottom it requires is not found in deep water in Denmark, but on the other hand goes down to 400 meters near the Shetlands. Even if the bathymetric distribution were dealt with in a different way we shall never attain to a survey of a fauna when its different species are described in many different works and almost all indication of quantity is wanting.

For the animal communities of the Danish waters I have perhaps drawn such narrow limits that they cannot all be used, if we go beyond the boundaries of these waters; towards deep water other communities exist, some even still deeper than *Brissopsis*; but I think that in all the boreal zones we should be able to determine the *Macoma* communities, in more restricted waters the *Venus* stations with certain Spatangids, and outside these the *Brissopsis* region. Where the orographical conditions of the bottom are not so simple as in the Kattegat and the western North Sea, complications will naturally arise, but the principal rule will certainly hold true and give much better results than the subjective judgment now used for determining whether this or that depth-curve or another must be considered as the true limit between animal communities or faunas.

Causes of the existence and distribution of the animal communities.

I cannot do better in introducing this section than recall the various statements of *Charles Darwin* in his book on the Origin of Species:

What determines the average number of individuals of a species is often not so much the quantity of food as this, that the species is sought after by other animals, which devour its individuals, for example the pursuit by the small rapacious animals of the game on English estates.

The climate may certainly be directly responsible for the death of many birds, but it does this as a rule by restricting the amount of nourishment, so that there is not enough for this species or its food competitors.

It often seems, as if a change of climate directly excludes one species to the benefit of another, but the reason is rather, that changes of climate favour one species more than another and even the smallest advantage is of great importance,

for each species at one or other period of its existence is exposed to extremely great destruction, either from downright enemies or from animals, which desire to take its place and food; the climatic change has thus influenced more indirectly by favouring the one species than by just damaging the other; it is only under very unfavourable conditions in arctic regions or in absolute deserts that the struggle is directly against the elements.

For example, many foreign plants can readily be cultivated in our waters, thus can stand the climate, but never become naturalized, for the reason that under these conditions they cannot stand against our own plants and animals.

The struggle is greatest between nearly related species. —

With these words »in mente« we may consider our animals in the sea, where the struggle both with other organisms and against the elements is certainly not less than on the land, which *Darwin* assuredly knew best and thus had specially in mind.

Considering first the *Macoma* community with its chief characteristic animal *Macoma baltica* and its many facies, we have seen above, that whilst its bivalves and Gastropods keep within the region indicated on the Chart, its worms and Echinoderms do not as a rule do so. *Lønnberg* calls this community the brackish water fauna; it certainly goes far up in the Baltic, some of its members (among others the 4 bivalves) into the innermost parts to Finland and Russia; thus it can live in water of very low salinity, ca. 6 ‰ and less (see *K. Brandt:* Die Fauna der Ostsee 1897). The animals have been called euryhaline and eurytherm, because they can stand great fluctuations both in salinity and temperature. But if they can do so, why are they lacking in almost the whole of the Kattegat and at many similar places, where a number of other salt-water animals live? They should be found especially on the *Venus* stations, whereas they occur only at a few places close to the coast where the »*Venus* animals« are wanting. It is obviously not the depth that is too great, nor is the salinity too high, for in the North Sea at places where the *Venus* animals are also wanting, inside the islands along the west coast of Slesvig and at the Thyborøn Channel, the *Macoma* community is found again in high salinity — to mention only a couple of examples among many. On the *Venus* region in the Kattegat we find *Mytilus edulis* up on the buoys put out by the coastguard, but naturally not the other bivalves of the *Macoma* community, which can only live on the bottom; *Appelløf* describes a *Macoma* community living along the rocky coast of West Norway, consisting of those of its animals which can live on rocks, especially *Mytilus*, *Littorina*, *Balani*, but these are situated uppermost on the rocks, to which the water only sometimes reaches with the flood-tide. It is difficult to see, what physical conditions could exclude these animals, for example, from the *Venus* stations of the Kattegat, when they can live both in the brackish water of the Baltic down to a depth of 20—25 meters and in the salt water on the west coast of Europe; — it must, in reality, be the »*Venus* animals« which exclude them, for these are wanting at all the places where the *Macoma* bivalves occur and just form ther boundary downwards towards deep water. The *Venus* stations cannot reach up onto the buoys in the Kattegat and at Heligoland *(Heincke)* and there we find *Mytilus edulis*, evidence that it would like to be in these waters and that its pelagic fry are actually living

there; the buoys namely are clean, newly painted when they are put out. A curious thing is, that *Macoma baltica,* according to *Ad. Jensen's* excellent investigations on the distribution of the northern Molluscs, does not occur at the Faeroes and Iceland, but at South-west Greenland and the west coast of America as well as from the warm area of the White Sea down to the Mediterranean and perhaps Madeira. He suggests, that the currents have not been able to carry them to the islands where they are wanting; but is it not possible, that the *Venus* animals are so strongly represented there that they exclude them? It would be of interest to know the distribution of the *Macoma* community bivalves in detail over the whole of their geographical region and to see, whether they always occur along with more or fewer of its other animals or whether they can enter into quite different communities under other conditions. It would lead too far afield to discuss this here and in any case investigations with the bottom-sampler are required for this purpose, if weare to de al with the characteristic species; but whatever the circumstances may be, I am unable to understand the distribution of the *Macoma* bivalves with us unless we take the biological factors into account, namely, the competition of the *Venus* animals.

It does not surprise me, that the Gastropods *Littorina*, *Rissoa* etc. of the *Macoma* region do not everywhere go out onto the *Venus* stations; for they follow the distribution of the Zostera and this plant is weak there, but where the Zostera reaches out in some quantity onto the *Venus* stations, it is accompanied as a rule with this On-fauna; it is the distribution of the characteristic bivalves which is so extraordinary, when we only think of the physico-chemical conditions as the regulating factor; these conditions are obviously insufficient to afford a proper explanation.

We must rather expect to find among the »*Venus* animals« a number of forms, which just seek after these bivalves, and I have had my suspicions here about the so common *Echinocardium cordatum*, *Ophioglypha* species and perhaps other Echinoderms, that they devour the small bivalve fry, when they fall down to the bottom; during these investigations *H. Blegvad* has found the bivalve fry in their stomachs, certainly not of the bivalves in question here but of *Mactra subtruncata.* The fry of this species occur in autumn in the Kattegat in quantities on the shallower *Venus* stations, but disappear again in the course of winter, so that only a few live till the next summer. Many hundreds are found on 1 m^2 in the autumn (see Appendix Nos. 43 and 44, p. 11), but only extremely few of the half-grown individuals of ca. 10—15 mm in length have been found by these investigations in the Kattegat; the old, adult *Mactra subtruncata* are quite wanting here, but occur in enormous quantities in certain years and locally in the North Sea (see App. No. 8, p. 65) up to a length of ca. 30 mm; I must assume, that it is from here that the immigration of the fry to the Kattegat takes place. In the Kattegat this fry constitutes the favourite food of the plaice in the autumn, and this fish has certainly a large share in its disappearance, especially as far as the individuals of several mm in length are concerned; *Echinocardium* and *Ophioglypha* certainly take them when smaller.

I conclude that the *Mactra* fry and other small organisms sink to the bottom in great quantities over the whole of the Kattegat; on the too soft bottom

they probably die; but the network of *Amphiurae* as well as other animals at many places will certainly cause their disappearance in the course of a few hours. Thus the *Mactra* fry and young live longest close to the land, where the Echinoderms hardly occur (see the shallowest *Venus* stations); but even here they have no permanent foothold; what the fish leave the waves and surf probably destroy. *Mactra* does not dig deep down into the bottom, but chiefly lies loose above the sand. The valuations give but slender information regarding the many rapacious animals which occur on the sea-bottom, for in the nature of the case they are more or less scattered and are thus not taken usually; but what an *Asterias rubens*, an *Astropecten* or the other large Asterids can accomplish in the direction of devouring the smaller organisms is astonishing, to judge from my investigations in aquaria and from examination of their stomachs; regarding the activity of the fishes we have certainly indefinite statements in quantitative respects; on the whole we can at present only suspect, what is going on in such a water as the Kattegat in regard to the changes in the course of the year, but I have thought it advisable to give some information based on observations to show, that the mutual relations between the animals of the sea-bottom are very close and intimate and hence obviously of decisive importance in determining the existence of the animals and their distribution. Unless we pay attention to the biological conditions, we shall never come to a true comprehension of this distribution; naturally, however, this does not mean dispensing with the outer factors which may be helpful in this study, for as a rule they are much easier to understand and oversee than the complicated biological conditions.

I am of opinion, therefore, that as a rule it is best to regard the animals living on the sea-bottom as communities, just as botanists group together the vegetation of the land into plant communities, even though in the present state of our knowledge it is impossible to show, how intimate the mutual relations are between the animals of the sea in the single cases. *Moebius* has called the animals living on an oyster bank a *biocoenosis*, laying here principal stress just on the intimate biological relations. If we wish to obtain more oysters on a bank, we must know how to alter the animal community *(biocoenosis)* to their advantage, among other things by exterminating their enemies; the modern American culture of oysters seems to show, that he was correct in ascribing to the biological factors this great importance.

At present we know extremely little in general regarding the mutual relations between the animals of the sea-bottom, except that some animals devour others and that certain animals live symbiotically to their mutual advantage, for example *Actiniae* on the whelk shells occupied by *Pagurus*, *Montacuta* etc.; but we may presuppose with *Darwin*, that strong forces must be at work to limit the number of individuals within each species. We should study these animals communities in aquaria specially fitted up for the purpose and with suitable soils.

In connection with the causes of the distribution of marine animals I may just mention, that my old method, of studying the biology of each single species from the »craddle to the grave«, has borne good fruits; the method is now in general use, especially for the fishes. This study has now been carried on to a large extent in North-European waters and we now know, that many of the species

at one stage of their life have a planktonic existence and later belong to the shallow water along the coasts, spreading out still later more towards deep water. This applies to several *Pleuronectidae;* others liks the the eel live during the whole of their growth in the *Macoma* community or in some of the shallowest, most enclosed parts of the *Venus* region, spawning and appearing as pelagic larva out in the middle of the Atlantic; this species traverses all the »Lebensbezirke« of marine zoogeography; if all other animals did likewise, we should almost be obliged to give up all divisions both in horizontal and vertical regards by simply mentioning the name of the species; and not a few species do something similar, many, probably most, of the animals of the sea-bottom at the coasts have indeed pelagic larvae and are thus carried far afield. The immigration of the *Mactra* fry to the Kattegat is an example of such a migration. One thing must be remembered, however, that we are here, for the time being at any rate, only engaged in the description of the animal life of the sea-bottom and thus exclude the pelagic stages; and the animals properly belonging to the sea-bottom seldom undertake such long migrations as the fishes. Naturally each species of the lower animals also requires to be studied in the same way as several species of fishes have been studied, but it will be a long time before this is done. Until then we must be content with regarding the matter from a practical standpoint, in other words not pay too much attention to the occurrence of single individuals, which may be exceptions to the rule, and on the whole make use of the commonest animals as the basis for characterization. In waters like the Danish within the Skaw there is so much opportunity for spreading everywhere, for example, with drifting algae and Zostera, that it is a proof of the strength of the factors which form the animal communities, that the latter nevertheless, in spite of the spreading tendency, continue in the main to persist. Exceptions to this rule, in the form of the occurrence of single adult animals as well as the temporary, wide distrihution of the fry of certain species at certain periods, should not be a matter of surprise; nor that on the boundaries between two communities there are regions, where the species of both seek to gain mastery of the place and are thus found mixed together. —

A remarkable feature in the occurrence of certain species of animals in our waters is this, that certain arctic forms, such as *Astarte borealis* and *Macoma calcarea*, occur in the Belt Sea and in the Baltic in such large quantities, but apparently do not live in the northern Kattegat nor in the North Sea, nor even, or in any case only scattered, at places along the Scandinavian coasts until we come further north; and that further up in the Baltic there live several other arctic species, I need only mention *Idothea entomon,* in great quantities, whilst they are not found again until we come to the White Sea. Several of the individuals of these species are undoubtedly directdescendants of an earlier arctic fauna, which has lived in these waters or in their neighbourhood (relicts). Their distribution with us agrees somewhat closely with that of the bivalves of the *Macoma* community; for these also occur most frequently in the inner parts oft he Belt Sea and Baltic; *Abra alba* has also a similar distribution with us. Yet these lastnamed animals are likewise found living at suitable places along the North Sea coasts at sheltered spots and in the innermost, shallow parts of the Scandinavian fjords etc.; their

distribution is thus sporadic, local, but the distances between these localities are not so great, that we are unable to consider them on the whole as being in biological connection with each other, at least at times. The appearance of these animals is therefore not specially surprising and as a rule we do not seek for any special explanation of the fact. Such animals have been called estuarine, and I am almost inclined to believe, that *Abra alba* seeks places, where there is a large quantity of organic material in the bottom (mud bottom), quiet conditions etc., thus just in the estuaries with their narrow, quiet waters and rich plant-life, and that this is one of the causes ofits distribution. But that the arctic animals have persisted with us must be explained on the hypothesis, that in these regions they have found conditions even at the present day, which suit them and have suited them the whole time, as also that they have become extinct at a number of other places, where the conditions have been unfavourable; the special hydrographical conditions in the deeper parts of the Belt Sea and in the Baltic, with relatively low summer temperature, have perhaps been a contributory moment, perhaps also the lower salinity. Both conditions may therefore be considered to have kept their enemies within suitable boundaries or quite excluded them. They are constantly tending to spread further out into the Kattegat, as we find in the case of the fry and isolated adult individuals; and it is only in the Belt Sea and Baltic that they appear as specially characteristic animals; in these investigations 2 young specimens of *Idothea entomon* have been found on the south coast of Scania in the Baltic (see App. Nr. 6, p. 49).

I have already shown, that the fauna of the south-western Kattegat has as a whole a more northern character than that of the northern and central parts of the Kattegat (see cruise of the gunboat »Hauch« 1893) and mention this here to show, that we do not reach far unless we use the occurrence of the animals on the sea-bottom as basis for our study; except on such a basis who would have imagined, that such arctic relicts occurred in our waters and the Baltic. *Sven Lovén* was the first to find these.

It is not my opinion, naturally, that outer conditions do not also play a direct part in the distribution of the animals; a sand-boring bivalve can naturally not be found on rocky bottom; animals which can only live on hard sand are not found on clay soil; often there is no doubt, that the nature of the bottom-soil has a direct influence on the existence of the animals, and probably the extreme conditions down towards the depths of the sea have such a great significance for many species, that they directly limit the occurrence of the species; but we must not believe, that each time we find a parallel between the distribution and this or that outer condition, that there is always a direct causal connection there. How often the depth itself has been taken as a direct, regulating factor and how little is that believed in now-a-days; we now believe as a rule in other factors accompanying the depth; but the depth is so easily determined and indicated by numbers and wil thus always retain its importance for the purposes of description.

Among the factors accompanying the depth we may note the nature of the bottom (sand, stones, soft mud, soft clay, hard clay etc.), temperature and its changes in the course of the year, the salinity and other qualities of the water,

the movements of the water, quantity of light, as some of the most important; they often have the shortcoming as indicators, that they cannot be easily and quickly determined and they often cannot be expressed numerically; the signs used are therefore often not comparable in the different investigations. Where we have to deal with constant temperatures as in the large seas, they may however be readily used and their importance has thus obtained general recognition, as also the salinity; but in the large seas this varies but little and thus loses considerably in usefulness. In practice the bottom-soil can only be described in general terms, yet this also gives good information. But to construct the distribution of the animals in the sea by means of all the combinations of these and other physical factors occurring in nature, is impossible. The animals are too sensitive toward the least change, which will certainly give rise to a series of quite unforeseen changes in the mutual relations of the animals. Yet we may follow this rule, that where we find uniform physical conditions, we may also expect to find uniform animal communities, provided that we do not go so far away, that insurmountable hindrances for the migrations of the animals come in the way, as for example in the case of marine animals the mainland or for coastal animals the depths of the ocean etc.

As already mentioned above, there is obviously an interaction going on between the animals of the sea-bottom, as represented in our bottom-sampler, and the other animals in the sea, which are bound more or less to the bottom; I refer here both to the »rare« rapacious animals, such as the whelks, Asterids, Crustacea that run or swim close over the bottom, *Palæmonidae* etc. and the bottom-fishes. As a rule we imagine, that the one serves as food for the other and that they compete for room. The so numerous Ophiurids are evidently of no little importance in this connection; all who have seen them in aquaria throwing out their arms over everything, especially edible objects, that sink down to the bottom in their proximity and notice, how the arrival rouses the neighbours several inches away, so that they literally throw themselves upon the booty and the largest as a rule takes the lion's share, must also include these among the rapacious animals of the sea, even if their gut and stomach is filled as a rule with detritus, and we only occasionally succeed in detecting small organisms inside them. I have doubted previously the rapaciousness of the Ophiurids, but my aquaria have convinced me of their interest for small living organisms. What a large *O. texturata* can accomplish with its flexible arms, which act like so many rapidly moving fishing apparatus, is astonishing and the regular distribution and large quantities of these animals make it reasonable to conclude, that they are of fundamental significance for the existence of small organisms in their neighbourhood. When we remember, that almost all organisms are small during a shorter or longer period of their life, we can understand, that these bottom-animals may obtain great influence on the distribution of many such animals, a fact that we little realize without close examination.

I believe therefore, that the persecution of the animals of the sea-bottom has set its mark, for example, on the developmental history of practically all the bottom-fishes; we know, that the young are fostered in the case of a number of fishes of the shallow water, i. e. the fishes which have demersal eggs developing

on the bottom: I may mention *Spinachia*, *Gasterosteus*, *Gunellus*, *Cottus*, *Cyclopterus*, *Syngnathidae*, *Gobius* and more; we have numerous observations of the powerful defence set up by the males against enemies that may approach the eggs. Another group of fishes lay large eggs enclosed in strong horny capsules, certain skates and dog-fishes; in this way the young are protected against a number of enemies. A third group of fishes bear large, living young, e. g. certain dog fishes, *Zoarces* etc., these both as egg and small fry thus escape their enemies. A fourth group of fishes show no fostering care, they lay pelagic eggs, which with the fry are left quite to themselves; here belong among others all the *Pleuronectidae*, *Gadidae*, *Anguilla* and a quantity of other important fishes. In this way they avoid coming near the bottom for a long period, though sooner or later the fry arrive there. In this group of fishes it is very remarkable, it seems to me, that the young of the Pleuronectids, which as small helpless organisms really seek down to the bottom, prefer to reach the shallow stretches along the coasts, where no Echinoderms or but few are found, for example, the young of the plaice and flounder, and of the sole and turbot group also, so far as known; but the Pleuronectids whose young sink to the bottom further out are on the whole, except the dab, considerably larger at the end of the pelagic stage. As examples I may note the young of the halibuts (2 species), *Drepanopsetta*, *Pl. cynoglossus*, *Pl. microcephalus*, certain *Arnoglossus* species etc. Owing to their size and mobility these young can more readily escape from the pursuit of the bottom-animals than the quite small fry of the first-named species. I may also note, that no freshwater fish is known with certainty to have pelagic eggs; in freshwater there are no Echinoderms.

Lastly, there are the large eel larvae with their prolonged pelagic stages; in the first place, owing to the variations of temperature in the course of the year at the coasts and most probably owing to the great persecution they would be exposed to here, they cannot pass through their development and metamorphosis in the smaller waters; on the other hand, the long eel fry (elvers) in their bottom-stage are remarkable for their strength and mobility. Here several factors obviously act together to keep the larvae away from the coasts, but it is a striking fact, that the fish larvae, which metamorphose within a short time just seek for the places in our waters which are poor in Echinoderms. A »*modus vivendi*« has apparently been struck with careful regard for the persecution of the bottom-animals; or it may be, that all the fry, which do not sink to the bottom at the coast at the right places, are always devoured by the bottom-animals; in other words the struggle is perpetual.

We can thus understand, why the bottom-stages of the plaice, in certain years at least, can develop at the bottom at a depth of 20—40 meters in the deep dark waters of the Baltic, but as a rule do not do so in the Kattegat or North Sea except near the beach in shallow water; for the true Baltic has no Echinoderms anywhere.

On the supposition that the physical conditions alone could explain the distribution of animals I have never been able to understand this phenomenon, but when we take the biological factors also into account, it becomes comprehensible, being analogous in fact with the distribution of the *Macoma* bivalves in the depths of the Baltic.

We must not forget to note, that there are fishes, like the herring and garfish, which lay their eggs on the bottom without fostering them and yet the species can persist. The garfish also seeks out the places in small waters which are poor in Echinoderms, a remarkable condition in such an oceanic fish, but the herring as a rule does not seem to take this precaution. And we have numerous witnesses to the fact, that other animals live on herring roe at such places; perhaps the enormous masses of the herring render it possible for it to satisfy the bottom-animals and yet leave young enough to maintain the species.

We might imagine, when so many bottom-fishes seek to avoid the pursuit of the bottom-animals by having pelagic eggs, that the persecution among the plankton animals is not so great as among the bottom-animals; for it is only under such conditions that all fostering of the young is dispensed with. This is perhaps the case, but perhaps also the larger number of eggs spawned by the fishes with pelagic eggs contributes to help them over the difficulties.

It would be easy to cite similar examples among other classes of animals than fishes to show, that in their development attention is paid to the persecution of the bottom-animals; but as we actually know but little regarding these things, I shall restrict myself to the reflections raised by the above-mentioned observations.

The geographical distribution ouside Denmark.

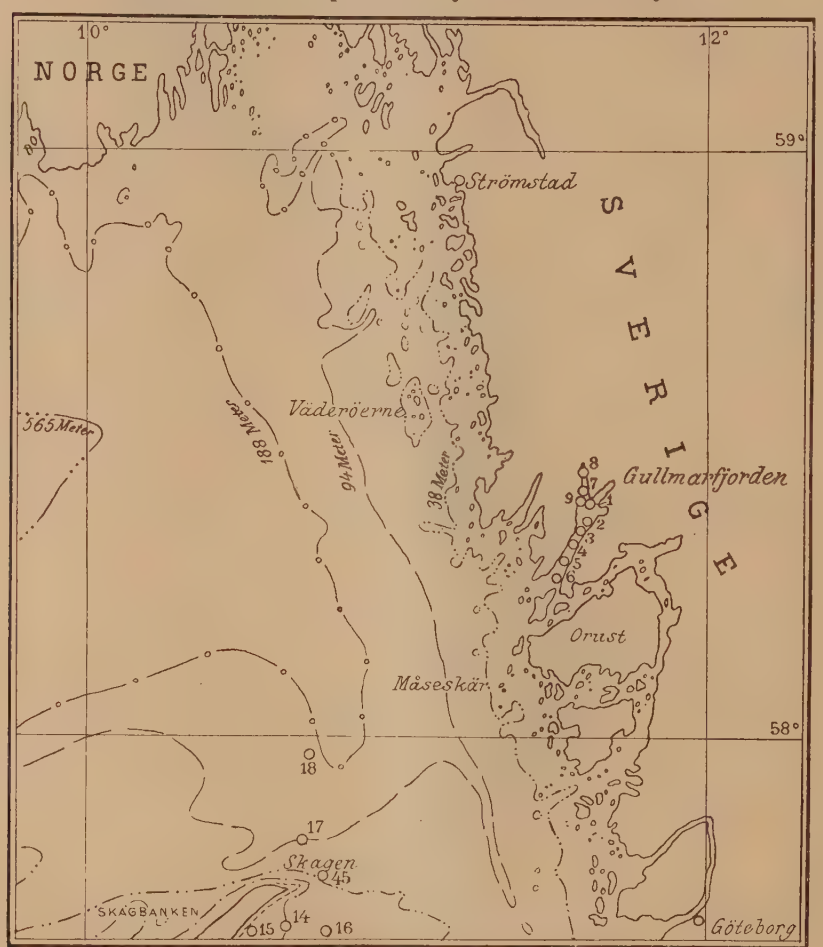
The following remarks may be made regarding the geographical distribution outside Denmark of the animal communities discussed in this paper.

If we wish to compare the fauna in one water with that in another, we can, as has always been the case hitherto, compare directly the respective lists of species; but this method gives no deep understanding of the resemblances or differences. Naturally we should rather compare the animal communities in the one water with the corresponding communities in the other, if they occur; in explanation of this point I may give here some examples.

In the Swedish Gullmar Fjord, north of Gothenburg (see Chart p. 38) I have made a series of preliminary valuations (App. pp. 61—62). Nos. 2—6 in the outer part of the fjord in 40—110 meters' depth give *Brissopsis* stations nearly related to those of the Kattegat. Nr. 9 far up in the fjord in 40 meters shows a related, but greatly reduced fauna; Nr. 7 in 18—19 meters shows a fauna resembling in broad lines the shallower *Turritella* stations of the Kattegat. Nr. 8 in 7 meters has a single *Abra alba* and no Echinoderms; it recalls several of our *Abra* stations. Lastly, Nr 1 in 5—7 meters farthest up in the fjord's innermost bight has *Macoma baltica* and *Arenicola*, thus resembling our enclosed *Macoma* community. The Gullmar Fjord may therefore be said in broad lines to be homologous with the whole Kattegat, the more so as I know communities from several places in the fjord which correspond to our rich Echinoderm community with *Modiola*; they occur out among the outermost fringe of islands.

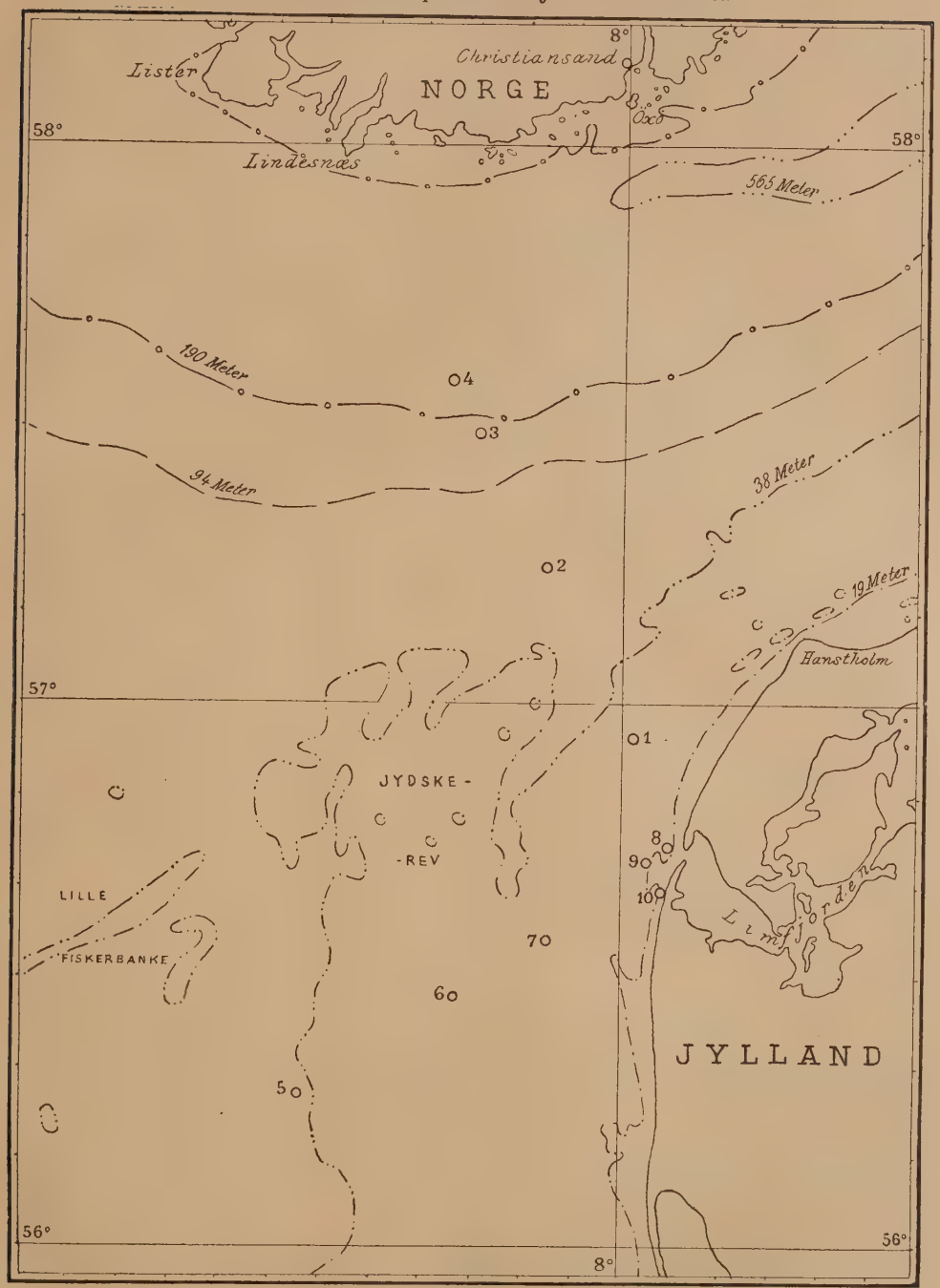
The deep Skagerak (App. p. 60), Nos. 17, 18 and 45, comes nearest to the *Brissopsis* stations of the Kattegat, but Nr. 17 in 90 meters is distinctly influenced by the deeper *Venus* animals, which here go further down than in the Kattegat. Even just to the north of the Skaw some of the communities go further out into deep water than in the Kattegat.

Stations examined quantitatively in the Gullmar Fjord.



In the North Seawe find the *Venus* stations reaching out to a depth of more than 50 meters (see Chart p. 39 and App. pp. 63—66). Only the two deepest stations Nos. 3 and 4 near the deep Norwegian Channel can here be separated from all the others in shallower water. The investigations in deep water, however, are so few and the quantity of animals so small, that I will not attempt an exact characterization of these 2 stations; on the other hand, all the stations off the west coast of Jutland in shallower water from 53 to 8,4 meters are undoubtedly to be considered as belonging partly to the shallower *Venus* stations. At Nr. 10 in 8,4

Stations examined quantitatively in the North Sea.



meters Echinoderms are quite wanting. This part of the North Sea should therefore only be compared with certain of the shallower parts of the Kattegat, those where the *Venus* stations are found. The usually small quantity of animals per 1 m^2 in the North Sea is remarkable, only Nr. 8 with its enormously large quantities of *Mactra subtruncata* is an exception. In 1912 it was not possible to find again this quantity of *Mactra*, which was thus probably a passing phenomenon; they lay as if washed together by waves into a walley in the sea-bottom.

But few animals retain the same depth-limits in the North Sea that they have in the Kattegat; but nothing is easier to understand. The outermost boundary of the sand bottom in the North Sea reaches further out to deep water, the pure clay is only met with later, all in agreement with the greater movements of the water in the North Sea. But that the distribution of the animals should therewith lose a definite order, I cannot believe; new communities will certainly be added out towards the deep water and certain *Venus* regions will project between the *Brissopsis* regions and the *Echinocardium* region known from the Kattegat. We thus see that *Sp. purpureus* and *E. flavescens* are widespread in the North Sea; a trace of this region was already present in the Kattegat.

To follow all the species out into the wider seas is for me impossible; the available information regarding them in the literature is as a rule too scattered; but with the help of *Th. Mortensen* I have endeavoured to follow the distribution of the principal Echinoderms along the coasts of Europe. I have thus found, that the Spatangids all go down to deeper water than in the Kattegat; *Brissopsis*, as in the Skagerak, to ca. 400 meters, but with one single record excepted never into shallower water than in the Kattegat, as a rule only into deeper. With a single exception *E. flavescens* only goes to 200—300 meters; *Sp. purpureus* is recorded sometimes out to ca. 900 meters, but as a rule only to 400—560 meters; *E. cordatum* never goes deep down and thus seems never to have been taken by the larger expeditions. We have to be content with this agreement in the results; in these records, however, there is no talk of these animals as characteristic animals, but only of the finding perhaps of a single specimen from prolonged trawling and further, possibilities of error are too often present.

Ophioglypha Sarsii, the Echinoderm which goes deepest in our valuations from the Kattegat, often goes down to ca. 700 meters, but as a rule only to 400—600 m.; at Spitzbergen on the other hand it reaches into shallow water; 20—40 meters.

On the other hand, the Echinoderms living in the depth of the Skagerak: *Poraniomorpha hispidi* (Syn *P. rosea), Psilaster Andromeda, Ophioscolex glacialis, Asteronyx Lovèni* and *Pteraster multipes*, go down to 1200, 1800 and 2000 meters, thus showing a tendency to live deeper than our other Echinoderms. There thus seems good reason to believe, that a similar order to ours is also found at other places; but the enormous variation in bathymetric distribution of many of these forms shows, how little the depth signifies as depth. Within each single region it is apparently the regulating factor and as such of great importance for orientation, but if we wish to compare different regions, we must compare the corresponding animal communities. We should draw sections or profiles of the animal communities in the seas and compare them with the aid of their characteristic animals, just as

the hydrographers prepare sections showing the temperature and salinity, instead of making scattered observations over large areas.

Some of the deeper animals spread out from the Skagerak along the continental coasts towards the north into arctic regions, others go both north and south; but to describe their enormously wide regions of distribution by single words as arctic or boreal seems incomprehensible to me; the newer designations cold-water form or warm-water form seem better. But what is warm and what is cold, when it is here as a rule a matter of +2 or +1° constant temperatures? I imagine that it is all cold; a designation by means of figures would certainly be preferable here. —

I know of only one attempt in the literature to characterize wide regions of the sea by means of quantitative characteristic animals. This is *Johan Hjort's* attempt with the fishes, as known from the fisheries statistics. Here we can probably assume, that the quantities of fish, especially of the useful species, are approximately correct for the different regions; thus in his and *Murray's* book »The Depths of the Ocean« p. 357 *et seq.* he succeeds in characterizing the fish-fauna of the coastal banks north of Great Britain by means of their quantity of cod, haddock, plaice and others; south of Great Britain however *Merluccius* is dominant almost down to the north coast of Africa, and further to the south again other species appear.

Hjort discusses also in detail, how long, narrow depth-zones along the coast of Europe are occupied by characteristic species of fishes, some in deeper, some in shallower water, but the depth for the same species often changes with the degree of latitude (temperature and light conditions); on p. 334 he writes, that on trawling in different depths from shallower to deeper water we obtain the impression, that we have there »as it were different levels, each with its own community« and that »it would be of interest to characterize these communities by means of the species, which occur in greatest quantity within each of them«.

If *Hjort* can already see this with the aid of the trawl and for the swiftly moving animals, may we not assume that the same will apply all the more to the slow animal species of the sea-bottom?

His chart p. 535 showing the spawning places of the 3 species of lings *(Molva)* is of interest; these 3 species spawn from Iceland to the coasts of France, but each within its own characteristic region, as the chart shows; it is not easy to characterize these 3 spawning regions in few words, they are so different in regard to depth and geographical situation.

I believe, that certain animal communities have similar occurrences in these waters, and that to be able to speak briefly of their occurrence we shall at some time simply refer to their characteristic animals in order to designate the regions in question. I can think of nothing else being used as the basis for the description of these regions, which extend as long narrow belts along the margin of the continent and in which the animals now find themselves at home. The animal communities thus become, like the plant communities in botany, the principal thing in zoogeography.

The efforts which have been made to set up horizontal divisions for the distribution of the animals along the sea-bottom (provinces) should only embrace the communities living in shallow water, otherwise too different communities are

mixed together. The vertical divisions (into zones, belts) have as a rule been only slightly characterized; the abyssal fauna however is now by all distinguished from the littoral. I should imagine, that the investigation and charting of the actually occurring animal communities will embrace all that is best in both methods. How narrowly the boundaries for such widely distributed animal communities have to be drawn, must be determined by future investigations of their characteristic animals. —

I cannot conclude these remarks on the geographical distribution without mentioning, that the factors determining the distribution of the animals and plants in the sea are, as known, not only the present conditions under which they live, but also the conditions which stand in connection partly with the developmental history of the globe and partly with the origin of the separate species in earlier times at places from which they have not been able to spread everywhere, being hindered by the land and sea connections, though they might well live everywhere. To unravel these last mentioned conditions belongs to one division of zoogeography, but what I endeavour to do here is, among other things, on the one hand to describe the distribution of the animals within the smaller regions, where only the factors operating at the present time may be considered to be regulative, on the other hand to seek for the causes of this distribution. We are probably entitled to assume, that this limitation of the task, which permits of a more exact investigation of the whole of the smaller region, will more readily lead to an understanding of these causes, both the physical and the biological, and that these investigations of communities will thus also obtain their due theoretical importance, though for my part there is always the hope that in this way practical results will accrue for the benefit of our aquiculture.

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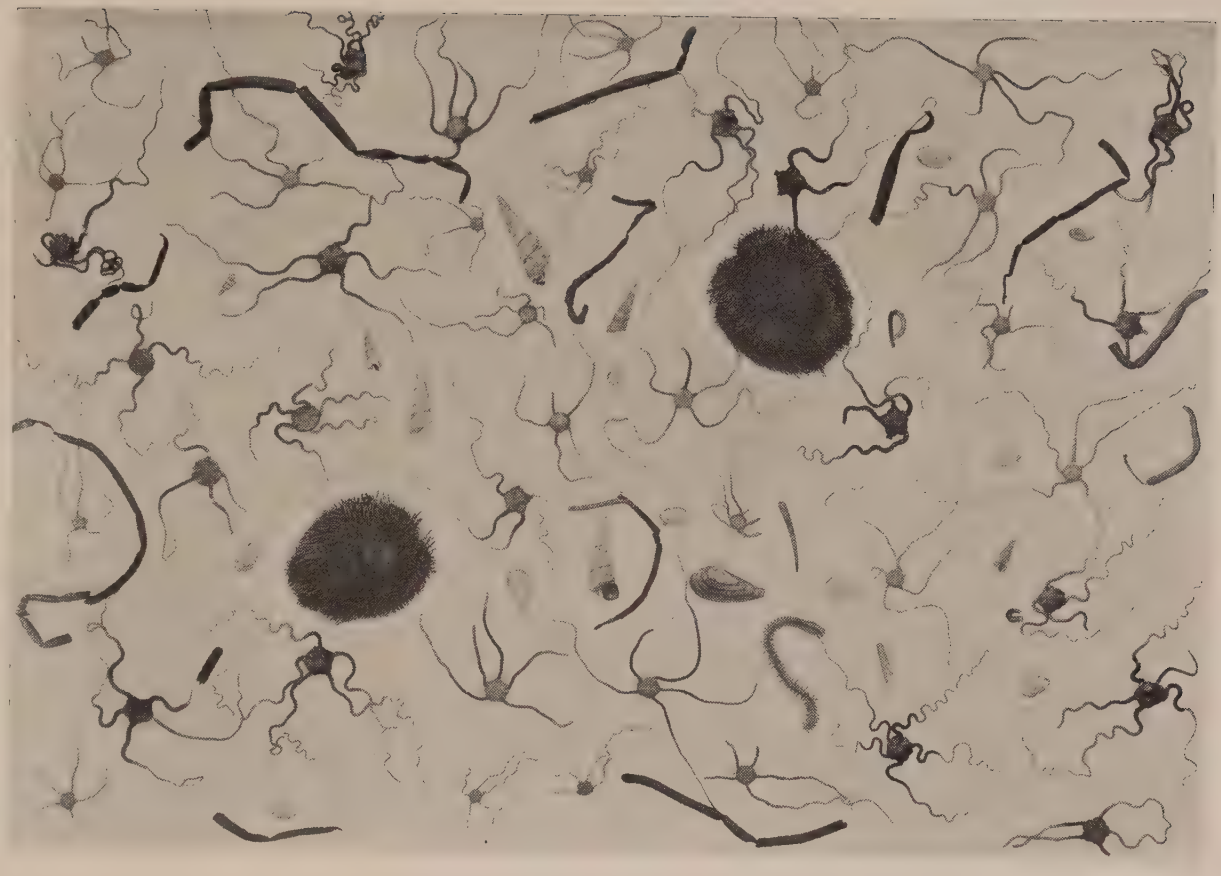
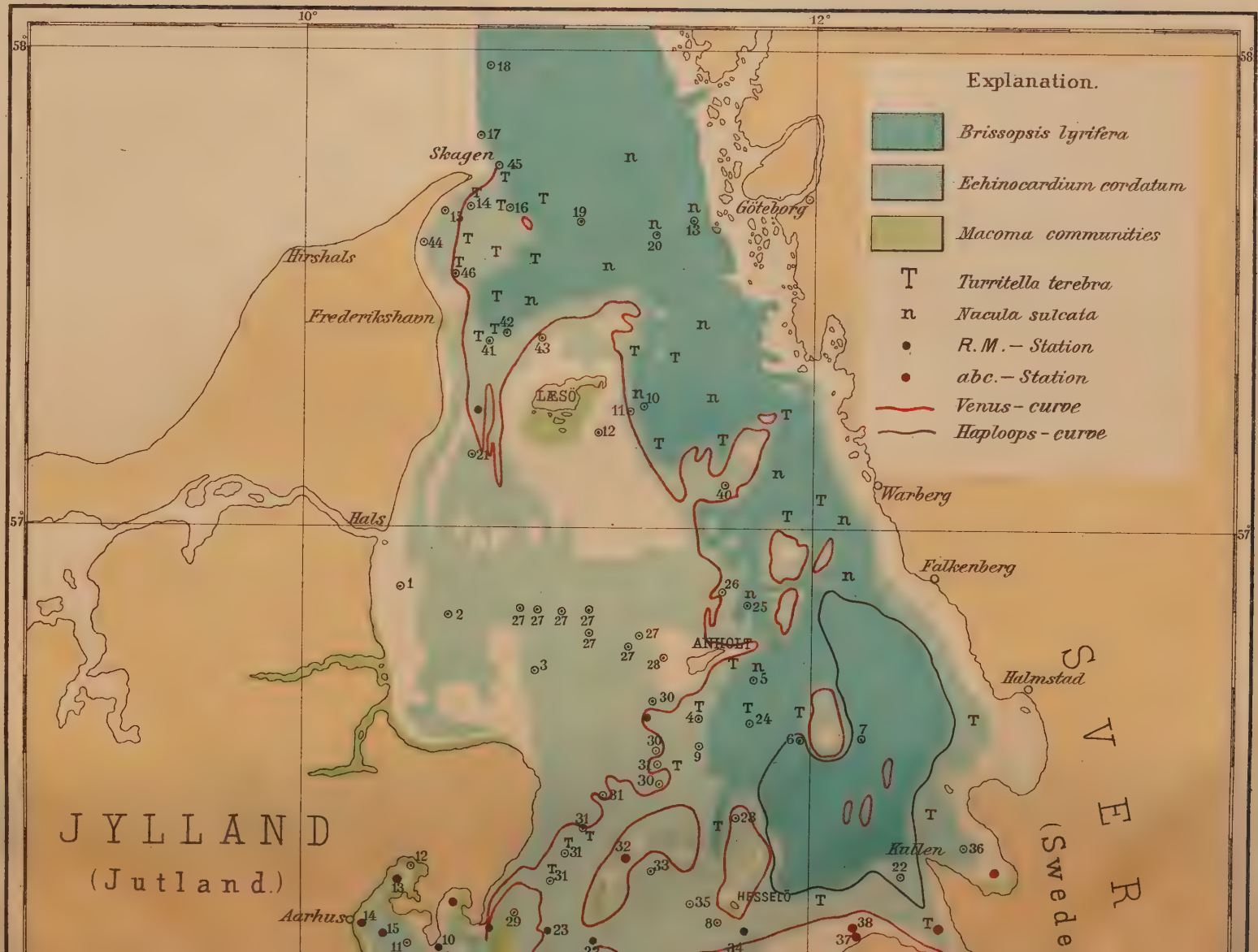


Pl. 5.

Pl. 6.

№ I.


Explanation.
Brissopsis lyrifera
Echinocardium cordatum
Macoma communities
T Turritella terebra
n Nacula sulcata
R.M. – Station
abc. – Station
Venus – curve
Haploops – curve
10°
12°
58°
57°
Skagen
Hirshals
Frederikshavn
Hals
LÆSÖ
Göteborg
Warberg
Falkenberg
Halmstad
ANHOLT
HESSELÖ
Kullen
Aarhus
JYLLAND
(Jutland.)
SVERIGE
(Sweden)

Centraltrykkeriet, Köbnn.

№ II.

10°
12°
58°
57°
Hard bottom
Sand, Gravel, Stones.
Soft bottom
blue clay
black mud
Mixed hard and soft bottom
Skagen
Göteborg
Hirshals
Frederikshavn
LÆSÖ
Warberg
Hals
Falkenberg
ANHOLT
Halmstad
SVERIGE
(Sweden)
JYLLAND
(Jutland)
Kullen
HESSELO
Aarhus

Centraltrykkeriet, København.

№ III.

Explanation.
3 Fathoms = c. 6 Meters
10 » = c. 19 »
20 » = c. 38 »
50 » = c. 94 »
100 » = c. 188 »
300 » = c. 565 »
I The Kattegat.
II Samsö Belt.
III Isefjord.
IV The Sound.
V Great Belt.
Va. Sealand archipelago.
VI Little Belt
VII Western Baltic.
VIII The true Baltic.
Boundary lines of the waters.
Stations valuated.
JYLLAND
(Jutland)
SVERIGE
(Sweden)
Skagen
Hirshals
Frederikshavn
Limfjorden
Hals
Aarhus
Göteborg
Warberg
Falkenberg
Halmstad
Kullen
SKAGBANKEN
HERTHAS FLAK
TRINDELEN
LÆSÖ
KOBBER GRUNDEN
FLADEN
LILLE MIDDELGR.
TANGEN
ST. MIDDELGR.
LYSEGR.
HESSELÖ
HASTENS GR.
SCHULTZ GR.

Centraltrykkeriet København.

APPENDIX

containing

Valuation lists . . . . . Page 1—66,

Summary of these . . . . . Page 67—68.

The Kattegat. B. n. Stations.

No. 13. pr. 1 m².	Number	Alcohol weight
Cardium minimum	1	0,01
Nucula sulcata	26	17,70
Turritella terebra	2	0,30
Panthalis Ørstedi	Fragm.	3,40
Lumbrinereis fragilis	1	0,10
Glycera sp.	1	0,10
Spionidæ	Fragm.	0,10
Nephthys sp.	3	1,00
Eumenia crassa	11	11,10
Brada sp.	2	0,30
Scalibregma inflatum	4	
Ampharetidæ	Fragm.	0,10
Amphiura Chiajei	62	9,00
» filiformis	42	2,60
Ophioglypha Sarsii	1	4,50
Brissopsis lyrifera	1	16,50
Amphipoda	11	0,20
Calocaris M'Andreæ	2	3,20
		70,21
		(6,25)

Close W. of Vinga.

Light Kattegat-clay with brown upper layer.

10 samples à 0,1 m². — Depth 58 meters.

1911, June 22'.

No. 20. pr. 1 m²	Number	Rough weight
Abra nitida	2,4	0,20
Saxicava rugosa	1,2	0,04
Axinus flexuosus	1,2	0,04
Nucula sulcata	34,4	24,12
Cylichna sp.	0,8	0,04
Lumbrinereis fragilis	1,2	0,65
Glycera sp.	5,6	3,89
Nephthys sp.	Fragm.	0,32
Cirratulus sp.	9,2	1,30
Eumenia crassa	0,4	0,32
Maldanidæ	∞	
Ampharetidæ	+	0,60
Pista cristata	0,4	
Pectinaria auricoma	Fragm.	0,28
Amphiura Chiajei	12,0	2,36
Brissopsis lyrifera	4,8	120,00
Crustacea	6,4	0,72
Pennatula phosphorea	0,4	0,48
Actiniidæ	0,4	0,32
Myxine glutinosa	0,4	2,92
		158,60
		(9,008)

8 miles W. of Vinga.

Light Kattegat-clay with brown upper layer.

25 samples à 0,1 m². — Depth 50—52 meters.

Temp. in the clay 8,6° C.

1911, July 10'.

No. 10. pr. 1 m²	Number	Alcohol weight
Abra nitida	6,5	0,75
Axinus flexuosus	5,0	0,85
Leda pernula	4,0	4,00
Nucula sulcata	6,5	4,00
Natica sp.	0,5	0,45
Turritella terebra	2,0	0,60
Cylichna cylindracea	0,5	0,05
Aphrodite aculeata	0,5	2,35
Panthalis Ørstedi	0,5	1,35
Lumbrinereis fragilis	Fragm.	
Glycera sp.	»	1,52
Goniada maculata	»	
Ammotrypane aulogaster	0,5	
Nephthys sp.	Fragm.	6,08
Maldanidæ	»	7,80
Balanoglossus Kuppferi	»	8,00
Amphiura Chiajei	47,5	18,60
Ophioglypha albida	8,0	2,80
Brissopsis lyrifera	19,0	360,00
Gammaridæ	7,0	0,65
Arcturus	0,5	0,10
Calocaris M'Andreæ	6,0	6,70
		426,65
		(22,34)

3 miles E. by S. of Flyndergrundens brush-buoy (Læsø).

Kattegat-clay, soft, gray, black spots in the underlying layers; these often were quite black and many dead leaves of Zostera were seen.

Distinct brown upper layer.

20 samples à 0,1 m². — Depth 60—75 meters.

Temp. 7,2° C.

1911, June 21'.

No. 25. pr. 1 m²	Number	Rough weight
Abra nitida	3	0,40
Leda minuta	1	0,30
Nucula sulcata	7	9,80
Turritella terebra	11	2,50
Dentalium entalis	3	1,00
Chætoderma nitidulum	4	0,20
Glycera sp.	10	6,40
Nephthys sp.	5	4,00
Brada villosa	1	0,20
Eumenia crassa	4	9,30
Maldanidæ	∞	26,50
Pectinaria auricoma	2	0,40
Amphiura Chiajei	254	52,20
» filiformis	169	
Brissopsis lyrifera	6	110,00
Cucumaria pentactes	1	0,20
Gammaridæ	2	0,20
Moera Loveni	1	0,20
		223,80
		(21,02)

7 miles N. E. by N. of Anholt Light.
Bluish-gray Kattegat-clay.
10 samples à 0,1 m². — Depth 42 meters.
1912, June 7'.

No. 5. pr. 1 m²	Number	Rough weight
Solen pellucidus	0,2	0,20
Cyprina islandica juv.	0,4	0,36
Leda pernula	1,4	1,44
» minuta	0,6	
Nucula sulcata	14,0	9,24
Modiolaria nigra	0,6	3,28
Turritella terebra	4,8	1,96
Philine sp.	0,6	0,02
Dentalium entalis	1,6	1,20
Aphrodite aculeata	0,4	0,48
Polynoidæ	0,4	0,02
Lumbrinereis fragilis	Fragm.	1,28
Glycera sp.	0,4	
Nephthys sp.	2,0	3,20
Eumenia crassa	9,6	14,30
Maldanidæ	Fragm.	1,92
Ammochares assimilis	1,2	
Terebellidæ	1,2	
Pectinaria belgica	3,4	2,44
Planaria	0,2	0,02
Amphiura Chiajei	188,6	46,80
» filiformis	12,4	3,20
Ophioglypha albida	2,0	0,94
Brissopsis lyrifera	2,5	50,00
Gammaridæ	2,2	0,18
Paguridæ	0,2	0,34
Crangon Allmani	0,2	0,26
Myxine glutinosa	0,2	4,12
		147,20
		(15,414)

S. E. ¾ S. of Anholt Light.
Gray, clayey bottom.
50 samples à 0,1 m². — Depth 40 meters.
1911, May 9'.

No. 19. pr. 1 m²	Number	Rough weight
Abra nitida	0,4	0,040
Corbula gibba	1,6	0,040
Cyprina islandica juv.	0,4	0,040
Cardium minimum	0,4	0,004
Nucula sulcata	0,4	0,440
Nassa pygmæa	0,8	0,080
Turritella terebra	36,4	17,560
Harmothoë sp.	0,4	4,600
Lumbrinereis fragilis	Fragm.	
Cirratulus sp.	ca. 20,0	
Nephthys sp.	Fragm.	4,600
Pectinaria auricoma	2,8	2,120
Amphiura Chiajei	∞	33,920
— filiformis		
Brissopsis lyrifera	10,0	56,000
Gammaridæ	3,6	0,280
Diastylis sp.	0,4	0,004
Pennatula phosphorea	16,4	9,760
Ascidiæ	0,4	2,240
		131,728
		(11,848)

16 miles S. E. by E. of Skagens Light.
Gray Kattegat-clay with brown upper layer.
25 samples à 0,1 m². — Depth 35 meters.
Temp. in the clay 13,4° C.
1911, July 10'.

No. 16. pr. 1 m²	Number	Rough weight
Abra nitida	3,2	0,080
Corbula gibba	0,4	0,008
Solen pellucidus	6,4	1,360
Venus gallina	1,2	0,040
Lucina borealis	0,8	0,640
Cyprina islandica juv.	0,4	0,020
Cardium echinatum	1,2	17,640
Montacuta sp.	0,4	0,004
Nucula sp.	0,4	0,004
Aporrhais pes pelecani	0,4	1,760
Turritella terebra	228,0	154,000
Cylichna sp.	2,4	0,080
Philine sp.	0,8	0,040
Dentalium entalis	1,2	1,240
Glycera sp.	0,8	0,400
Aricia sp.	0,4	0,400
Nephthys sp.	1,6	0,400
Maldanidæ	Fragm.	0,400
Pectinaria auricoma » belgica	6,8	0,400
Phascolosoma	3,2	0,320
Amphiura Chiajei	+	83,480
» filiformis	∞	
Ophioglypha albida	1,6	0,600
Brissopsis lyrifera	5,2	130,000
Echinocardium cordatum	8,4	90,000
Gammaridæ	2,8	0,080
Paguridæ	7,2	1,640
Ebalia Cranchii	0,4	0,080
Pennatula phosphorea	0,4	0,640
Ascidiæ	0,4	0,080
		485,836
		(31,704)

6,5 miles S. E. and S. E. by S. ½ S. of Skagens Light.
Fine sand with fine particles, distinct brown layer; black stripes in the underlying layer.
25 samples à 0,1 m². — Depth 24,5 meters.
Temp. 14,0° C.
1911, July 7'.

No. 42. pr. 1 m²	Number	Rough weight
Abra alba	5	0,30
Abra nitida	76	6,40
Axinus flexuosus	8	1,00
Leda pernula	14	16,40
» minuta	5	0,60
Turritella terebra	70	21,60
Cylichna cylindracea	2	0,20
Chætoderma nitidulum	13	1,30
Aphrodite aculeata	2	36,00
Glycera sp.	3	0,70
Nephthys sp.	Fragm.	8,60
Eumenia crassa	1	2,00
Notomastus latericius	3	0,60
Maldanidæ	64	2,90
Ampharetidæ	1	0,10
Pectinaria auricoma	5	0,30
» belgica	2	8,60
» Koreni juv.	ca. 25	3,80
Gephyrea	1	0,10
Nemertini	1	0,80
Amphiura Chiajei	ca. 200	113,50
» filiformis	ca. 200	
Brissopsis lyrifera	14	450,00
Cucumaria pentactes	1	2,20
Pennatula phosphorea	2	2,30
		680,30
		(47,92)

5 miles N. W. of Nordre Rønner Light.
Dark clay with brown upper layer.
10 samples à 0,1 m². — Depth 41 meters.
1912, August 30'.

No. 24. pr. 1 m²	Number	Rough weight
Abra nitida	19	1,90
Solen pellucidus	3	1,20
Neæra cuspidata	1	0,30
Lyonsia norvegica	1	0,10
Axinus flexuosus	11	0,30
Leda minuta	1	0,10
Nucula tenuis	3	0,50
» sulcata	2	0,60
Aporrhais pes pelecani	4	14,20
Turritella terebra	78	33,30
Philine sp.	1	0,10
Dentalium entalis	9	3,40
Aphrodite aculeata	1	1,90
Lumbrinereis fragilis	1	15,20
Glycera sp.	6	0,90
Nephthys sp.	Fragm.	0,40
Eumenia crassa	5	4,50
Maldanidæ	Fragm.	1,40
Ammochares assimilis	»	1,30
Pectinaria auricoma	4	0,80
Ampharetidæ	Fragm.	0,20
Terebellidæ	»	1,30
Artacama proboscidea	7	1,30
Sipunculidæ	9	0,60
Amphiura sp.	ca. 100	20,50
Brissopsis lyrifera	5	133,00
Cucumaria pentactes	3	5,30
Gammaridæ	2	0,20
Portunus depurator	1	0,20
Porifera	3	0,70
		245,70
		(18,34)

10,5 miles S. ½ E. of Anholt Light.
Light Kattegat-clay.
10 samples à 0,1 m². — Depth 26 meters.
1912, June 6'.

The Kattegat. Haploops-Stations.

No. 4. pr. 1 m²	Number	Rough weight
Abra nitida	1,8	0,16
Mya sp. juv.	0,2	0,02
Solen pellucidus	1,8	0,58
Venus gallina	0,4	0,12
Dosinia lincta	0,6	2,10
Cyprina islandica	1,4	66,60
» » juv.	1,4	0,18
Cardium echinatum	0,2	6,70
» minimum	0,4	0,02
Axinus flexuosus	1,0	0,04
Montacuta ferruginosa	0,2	0,02
Leda minuta	0,2	0,02
Nucula sulcata < 15 mm.	0,4	0,10
Aporrhais pes pelecani	5,6	25,20
Turritella terebra 7-35 mm	58,0	22,30
Cylichna cylindracea	0,4	0,02
Dentalium entalis	9,8	4,30
Aphrodite aculeata	0,6	3,50
Nephthys sp.	Fragm.	3,12
Lumbrinereis fragilis	»	
Glycera sp.	1,0	
Goniada maculata	1,0	
Aricia sp.	Fragm.	4,86
Ammotrypane aulogaster	1,2	
Brada villosa	0,8	
Notomastus latericius	0,6	
Pectinaria auricoma	8,4	9,80
Maldanidæ	Fragm.	
Ammochares assimilis	»	0,88
Ampharetidæ	0,6	
Amphiura Chiajei	32,8	8,70
» filiformis	2,0	0,60
Brissopsis lyrifera <45mm	2,6	69,40
Echinocardium cordatum	0,2	3,00
Cucumaria sp.	0,6	0,50
Gammaridæ	0,6	0,02
Decapoda	1,2	0,56
Foraminifera	1,8	0,02
		233,44 (15,864)

S. W. of Anholt.
Bottom gray, clayey, coherent, with sand.
50 samples à 0,1 m². — Depth 26 meters.
1911, May 8'.

No. 6. pr. 1 m²	Number	Rough weight
Abra nitida	1,2	0,08
Astarte sp.	0,4	0,08
Cyprina islandica	0,4	68,48
Cardium minimum	0,4	0,04
» fasciatum	2,0	0,12
Leda minuta	0,8	0,08
Nucula tenuis	1,2	0,08
Modiolaria nigra	0,4	1,32
Lima Loscombii	0,8	0,44
Pecten septemradiatus	2,4	9,28
Neptunea antiqua	0,4	5,04
Dentalium entalis	2,0	0,80
Aphrodite aculeata	0,8	5,76
Lumbrinereis fragilis	Fragm.	2,17
Glycera sp.	4,0	2,17
Goniada maculata	2,4	1,09
Aricia norvegia	2,4	2,17
Nephthys sp.	Fragm.	4,34
Trophonia plumosa	0,8	1,09
Eumenia crassa	2,8	2,17
Maldanidæ	Fragm.	0,49
Ammochares assimilis	»	0,10
Pectinaria auricoma	4,0	1,16
Ampharetidæ	0,4	0,05
Terebellidæ	Fragm.	1,05
Sabellidæ	0,4	0,09
Nemertini	Fragm.	0,60
Amphiura Chiajei	8,0	2,44
Ophioglypha albida	4,8	1,20
» robusta	23,6	1,16
Brissopsis lyrifera	2,4	65,60
Str. drøbakiensis	2,0	2,52
Haploops tubicola	∞	18,00
Hyas coarctatus	0,8	1,04
		202,30 (13,952)

W. of Store Middelgrund.
Brown-gray sand, clayey, with much detritus.
25 samples à 0,1 m². — Depth 30—32 meters.
1911, May 9'.

No. 7. pr. 1 m²	Number	Rough weight
Mya sp.	1,0	0,50
Axinus flexuosus	1,0	0,10
Leda pernula	1,0	0,10
Nucula sulcata	1,0	1,10
Pecten septemradiatus	4,0	12,70
Panthalis Ørstedi	1,0	1,00
Glycera sp.	Fragm.	0,70
Goniada maculata	»	0,30
Aricia norvegica	1,0	0,70
Eumenia crassa	21,0	48,80
Balanoglossus Kuppferi	Fragm.	0,40
Nemertini	»	1,50
Amphiura Chiajei	16,0	6,30
Brissopsis lyrifera	5,0	179,00
Haploops tubicola	600,0	7,00
		260,20 (16,33)

E. of Store Middelgrund.
Fresh-smelling, gray-brown ooze; the whole surface covered with Gammarid tubes.
10 samples à 0,1 m². — Depth ca. 60 Meters.
1911, May 9'.

The Kattegat. E. T. Stations.

No. 22. pr. 1 m²	Number	Rough weight
Venus ovata	5	2,80
Cardium fasciatum	2	0,50
Axinus flexuosus	8	0,80
Leda minuta	3	0,30
Lima Loscombii	6	1,70
Pecten septemradiatus	2	17,90
Buccinum undatum	1	3,40
Bela Trevelyana	1	0,10
Aphrodite aculeata	1	10,70
Glycera sp.	4	1,70
Goniada maculata	2	0,20
Eumenia crassa	8	15,80
Maldanidæ	Fragm.	2,80
Pectinaria auricoma	3	1,10
Sabellidæ	1	1,80
Balanoglossus Kuppferi	Fragm.	0,90
Nemertini	»	2,50
Ophioglypha albida	3	0,60
» robusta	85	4,90
Str. drøbakiensis	6	17,30
Gammaridæ	1	0,20
Haploops tubicola	ca. 3500	30,00
Hyas coarctatus	1	2,90
Virgularia mirabilis	1	0,50
		121,40
		(11,16)

4 miles W. S. W. of Kullen.
Light ooze with Gammarid tubes.
10 samples à 0,1 m². — Depth 27—29 meters.
1912, June 4'.

No. 14. pr. 1 m²	Number	Rough weight
Abra alba?	1,6	0,52
» nitida	1,2	
Tellina fabula	4,8	0,60
Mya sp.	0,4	0,24
Solen pellucidus	12,4	3,40
Axinus flexuosus	12,0	1,16
Nucula nitida?	16,4	3,96
Bela turricula	0,4	0,04
Aporrhais pes pelecani	1,6	7,60
Turritella terebra	∞	96,00
Nephthys sp.	4,0	0,67
Ammotrypane aulogaster	0,8	0,17
Maldanidæ	Fragm.	0,52
Pectinaria auricoma	1,2	0,12
Phascolosoma	18,4	2,48
Ophiotrix fragilis	0,4	0,20
Amphiura Chiajei	0,8	0,24
» filiformis	∞	49,92
Ophioglypha albida	1,6	0,84
» texturata	0,4	1,28
Asterias rubens	0,8	4,20
Echinocardium cordatum	15,2	136,00
Gammaridæ	1,2	0,04
Portunus sp.	0,4	5,92
Paguridæ	4,4	1,36
Ascidiæ	0,4	1,00
		318,48
		(20,912)

3 miles S. of Skagen's harbour.
Dark sand with fine detritus, brown upper layer.
25 samples à 0,1 m². — Depth 12—19 meters.
1911, July 7'.

No. 46. pr. 1 m²	Number	Rough weight
Abra nitida	11	1,20
Macoma calcarea	1	0,60
Solen pellucidus	15	4,40
Cardium echinatum	1	0,20
Axinus flexuosus	102	10,50
Montacuta ferruginosa	3	0,20
Nucula tenuis	6	22,90
» nitida	78	
Turritella terebra	47	78,00
Cylichna cylindracea	4	0,20
Philine aperta	2	12,30
Aricia armiger	1	0,10
Nephthys sp.	Fragm.	8,40
Phascolosoma	1	0,30
Nemertini	Fragm.	1,80
Amphiura filiformis	ca. 300	38,20
Ophioglypha albida	4	1,40
Asterias rubens	1	2,00
Echinocardium cordatum	20	310,00
Portunus depurator	1	1,80
		494,50
		(27,10)

3 miles N. N. W. of Hirtsholmene.
Dark, soft clay with a little sand.
10 samples à 0,1 m². — Depth 15 meters.
1912, September 4'.

No. 41. pr. 1 m²	Number	Ruogh weight
Mya sp.	1	0,20
Axinus flexuosus	1	0,20
Leda minuta	3	0,20
Nucula tenuis	1	0,10
Aporrhais pes pelecani	6	23,70
Turritella terebra	250	200,00
Philine aperta	5	3,20
Dentalium entalis	1	0,20
Enipo Kinbergi	1	0,30
Lumbrinereis fragilis	1	0,40
Glycera sp.	Fragm.	5,20
Goniada maculata	1	0,20
Nephthys sp.	2	1,00
Ammotrypane aulogaster	2	0,40
Eumenia crassa	2	2,20
Notomastus latericius	∞	9,80
Maldanidæ	∞	0,90
Terebellidæ	1	0,20
Sipunculidæ	7	0,40
Nemertini	Fragm.	0,70
Amphiura Chiajei	ca. 100	47,00
» filiformis	ca. 100	
Astropecten Mülleri	1	6,50
Echinocardium cordatum	4	56,50
		359,50
		(28,32)

6 miles S. E. of Frederikshavn.
Dark clay with a little sand.
10 samples à 0,1 m². — Depth 25 meters.
1912, September 5'.

No. 11. pr. 1 m²	Number	Rough weight
Abra alba?	1,0	0,30
» nitida	8,5	0,60
Saxicava rugosa	0,5	0,05
Solen pellucidus	15,0	3,10
Cardium echinatum	1,0	45,50
Axinus flexuosus juv.	∞	5,55
Montacuta ferruginosa	5,5	0,10
Nucula tenuis	1,5	0,15
» nitida	2,5	0,40
Aporrhais pes pelecani	2,5	11,25
Turritella terebra	61,5	71,60
Cylichna sp.	6,5	0,15
Philine sp.	1,5	0,05
Dentalium entalis	1,0	0,80
Aphrodite aculeata	0,5	0,20
Leanira tetragona	0,5	
Goniada maculata	1,0	
Aricia armiger	2,0	1,77
Ammotrypane aulogaster	0,5	
Brada villosa	1,0	
Nephthys sp.	Fragm.	1,77
Maldanidæ	»	
Ammochares assimilis	0,5	0,44
Terebellidæ	Fragm.	
Pectinaria auricoma	4,5	1,10
Nemertini	Fragm.	0,88
Planaria	»	0,44
Amphiura Chiajei	0,5	0,05
» filiformis	+	0,75
Ophioglypha albida	1,5	0,50
Echinocardium cordatum	∞	340,00
Cucumaria sp.	0,5	0,60
Gammaridæ	12,0	
Cirrolana	0,5	0,40
Decapoda	0,5	
Paguridæ	0,5	
		488,50
		(21,695)

S. E. by E. of Flyndergrundens buoy.
Bottom light, »mixed«, very sandy, with slight brown layer.
The bottom sampler digged 8—10 cm into the bottom.
20 samples à 0,1 m². — Depth 28 meters.
1911, June 20'.

No. 31. pr. 1 m²	Number	Rough weight
Abra nitida	1	0,10
Thracia papyracea	1	0,10
Solen pellucidus	1	0,20
Venus gallina	3	2,70
Cyprina islandica juv.	5	10,20
Axinus flexuosus	4	0,30
Montacuta sp.	1	0,10
Nucula tenuis	1	0,10
Turritella terebra	32	29,30
Philine sp.	1	0,20
Glycera sp.	1	0,20
Nephthys sp.	5	2,60
Ophelia limacina	1	0,10
Travisia Forbesi	1	1,20
Pectinaria auricoma	2	0,20
Ampharetidæ	1	0,10
Sabellidæ	1	0,20
Planaria	1	0,10
Amphiura filiformis	ca. 50	14,20
Ophioglypha albida	1	0,20
» affinis	1	0,10
Echinocardium cordatum	12	134,70
Str. drøbakiensis	1	4,50
Psolus phantapus	1	6,70
Gammaridæ	2	0,10
Actiniidæ	1	0,10
		208,60
		(11.51)

In a line off Djursland, from 15 miles E. of Fornæs to 7 miles E. by S. of Jernhatten.
Sand with detritus and soft bottom.
(St. No. 31 on the chart is at 5 places.)
10 samples à 0,1 m². — Depth 18—22 meters.
1912, Juni 8'.

No. 9. pr. 1 m²	Number	Rough weight
Abra nitida	7,0	0,75
Macoma calcarea	0,5	0,05
Solen pellucidus	5,5	1,75
Psammobia færøensis	0,5	0,05
Venus gallina	0,5	0,10
Lucina borealis	1,0	0,75
Cyprina islandica	Fragm.	2,85
Axinus flexuosus	2,0	0,15
Montacuta ferruginosa	1,5	0,05
Nucula nitida	5,0	2,35
» tenuis	13,5	1,85
Aporrhais pes pelecani	2,0	7,05
Turritella terebra	6,5	0,85
Cylichna cylindracea	1,5	0,05
Dentalium entalis	3,0	2,00
Neomenia sp.	0,5	0,35
Aphrodite aculeata	0,75	5,50
Glycera sp.	2,0	0,35
Goniada maculata	1,5	0,26
Nephthys sp.	Fragm.	2,33
Ammotrypane aulogaster.	0,5	0,26
Travisia Forbesi	0,5	0,09
Brada villosa	3,0	0,34
Eumenia crassa	2,0	1,72
Maldanidæ	Fragm.	1,29
Pectinaria auricoma	8,0	0,65
Terebellidæ	Fragm.	0,86
Amphiura filiformis	32,5	8,30
Astropecten Mülleri	1,5	4,40
Echinocardium cordatum.	10,5	128,50
Gammaridæ	12,0	1,25
Isopoda	1,0	
Paguridæ	1,0	
		177,10
		(9,655)

11 miles S. by W. $^1/_2$ W. of Anholt.
Light »mixed« bottom, somewhat different hard and soft according to the depth. Not many dead shells, but some of Cyprina, Turritella etc.
20 samples à 0,1 m². —. Depth 25—26 meters.
1911, June 20'.

No. 35. pr. 1 m²	Number	Rough weight
Abra nitida	9	0,20
Saxicava rugosa	1	0,10
Corbula gibba	1	0,10
Solen pellucidus	2	0,40
Venus gallina	1	0,10
Cyprina islandica juv.	5	0,40
Cardium minimum	1	0,10
Axinus flexuosus	3	0,10
Montacuta ferruginosa	2	0,10
Leda minuta	1	0,10
Nucula nitida	1	0,40
» tenuis	9	1,20
Natica pulchella	1	0,10
Aporrhais pes pelecani	1	4,00
Turritella terebra	12	1,50
Philine sp.	1	0,10
Chætoderma nitidulum	1	0,10
Polynoidæ	Fragm.	0,10
Nephthys sp.	»	6,00
Ammotrypane aulogaster.	1	0,50
Maldanidæ	8	0,40
Artacama proboscidea	2	0,40
Amphitrite cirrata	1	2,00
Nemertini	2	0,30
Amphiura filiformis	65	6,00
Ophioglypha albida	2	0,10
Brissopsis lyrifera juv.	1	1,40
Echinocardium cordatum.	14	150,00
» » juv.	6	2,80
Gammaridæ	8	0,30
		179,40
		(8,39)

7 miles W. $^1/_2$ N. of Hesselø Light.
Sand + detritus, soft, coherent.
10 samples à 0,1 m². — Depth 22 meters.
1912, June 28'.

No. 33. pr. 1 m²	Number	Rough weight
Abra nitida	7,0	0,30
» prismatica	0,5	0,05
Macoma calcarea	0,5	0,05
Tellina fabula	1,0	0,10
Solen pellucidus	3,5	0,40
Venus gallina	1,5	1,50
Cyprina islandica	5,0	237,50
Axinus flexuosus	16,0	1,20
Montacuta ferruginosa	4,5	0,15
Nucula nitida	0,5	0,10
» tenuis	6,0	0,90
Natica pulchella	0,5	0,10
Cylichna cylindracea	0,5	0,05
Enipo Kinbergi	Fragm.	0,40
Phyllodoce maculata	Fragm.	0,60
Glycera sp.	0,5	0,10
Goniada maculata	Fragm.	0,40
Aricia armiger	0,5	0,05
Nephthys sp.	Fragm.	1,15
Ammotrypane aulogaster.	1,5	0,95
Maldanidæ	Fragm.	0,50
Pectinaria auricoma	0,5	0,40
Sabellidæ	1,0	1,25
Nemertini	0,5	0,05
Planaria	1,0	0,10
Ophiopholis aculeata	0,5	0,50
Amphiura filiformis	62,5	8,85
Ophioglypha albida	1,5	0,35
Echinocardium cordatum	21,0	240,50
» » juv.	7,0	0,65
Str. drøbakiensis	0,5	3,35
Synapta inhærens	0,5	0,10
Gammaridæ	12,0	0,45
		503,10
		(23,64)

4 miles S. S. E. of the buoy at Briseis Flak.
Fine sand with detritus.
10 samples à 0,2 m². — Depth 21 meters.
1912, June 27'.

No. 36. pr. 1 m²	Number	Rough weight
Abra nitida	21	2,90
Solen pellucidus	3	1,70
Cyprina islandica juv.	2	0,10
Cardium echinatum	1	14,20
Axinus flexuosus	1	0,10
Leda pernula	13	9,80
Nucula nitida	9	0,90
» tenuis	43	2,30
Natica grønlandica	1	1,40
Aporrhais pes pelecani	1	3,50
Turritella terebra	13	3,00
Chætoderma nitidulum	2	0,20
Aphrodite aculeata	1	0,50
Lumbrinereis fragilis	2	3,70
Nephthys sp.	22	8,20
Maldanidæ	ca. 30	0,60
Terebellides Strømi	6	1,50
Artacama proboscidea	1	0,10
Amphiura Chiajei	15	5,80
» filiformis	140	18,00
Ophioglypha albida	8	1,70
Echinocardium cordatum.	9	28,80
Gammaridæ	1	0,10
Diastylis sp.	2	0,10
Virgularia mirabilis	5	4,60
		113 80
		(10,57)

4—6 miles E. of Kullen.

Bottom light clay with many dead shells.

10 samples à 0,1 m². — Depth 21—22 meters.

1912, August 14'.

No. 8. pr. 1 m²	Number	Rough weight
Abra nitida	3,6	0,08
Macoma calcarea	2,0	2,44
Tellina fabula	0,8	0,08
Saxicava rugosa	0,4	0,04
Psammobia færøensis	0,4	0,04
Cyprina islandica	Fragm.	36,00
Cardium minimum	0,4	0,04
Axinus flexuosus	0,8	0,04
Montacuta ferruginosa	1,2	0,04
Nucula tenuis	4,0	0,36
Modiola modiolus	Fragm.	12,00
Nassa pygmæa	0,4	0,04
Natica pulchella	0,8	0,08
Turritella terebra	0,4	0,12
Tectura virginea	0,4	0,04
Cylichna cylindracea	0,4	0,04
Dentalium entalis	0,4	0,08
Chiton cinereus	2,0	0,16
Glycera sp.	0,4	0,11
Goniada maculata	0,4	
Nephthys sp.	Fragm.	1,83
Ammotrypane aulogaster.	2,4	0,72
Pectinaria auricoma	10,4	1,36
Maldanidæ	Fragm.	0,388
Sabellidæ	0,8	
Amphitrite cirrata	3,6	2,88
Ophiopholis aculeata	12,4	9,20
Amphiura filiformis	8,4	2,12
Ophioglypha robusta	0,8	0,04
Asterias rubens	0,4	0,08
Echinocardium cordatum.	6,8	68,08
Echinocyamus pusillus	2,4	0,08
Str. drøbakiensis	1,6	6,92
Gammaridæ	13,2	0,52
Portunus sp.	0,4	
Eupagurus Bernhardus	0,4	
		146,048
		(7,460)

4 miles W. S. W. of Hesselø.

Light »mixed« bottom, rather hard. — Cyprina hardly taken up all. Many dead shells of Cyprina, Card. echinatum, Turritella, Pecten and Macoma calcarea.

25 samples à 0,1 m². — Depth 22 meters.

1911, June 20'.

The Kattegat. E. (v.) Stations.

No. 40. pr. 1 m²	Number	Rough weight
Abra prismatica	5,5	1,36
Saxicava rugosa	1,8	0,73
Thracia papyracea	1,8	0,91
Solen pellucidus	1,8	0,91
Lucina borealis	2,7	1,27
Nucula tenuis	3,6	0,27
Natica pulchella	1,8	0,36
Aporrhais pes pelecani	0,9	2,00
Turritella terebra	2,7	1;82
Acera bullata	0,9	0,09
Dentalium entalis	10,9	4,73
Chætopterus sp.	0,9	0,64
Glycera sp.	1,8	0,09
Goniada maculata	1,8	0,09
Aricia armiger	Fragm.	0,27
Nephthys sp.	2,7	1,00
Ophelia limacina	2,7	0,18
Ammotrypane aulogaster.	0,9	0,18
Travisia Forbesi	0,9	0,18
Maldanidæ	Fragm.	0,27
Pectinaria auricoma	1,8	0,64
Terebellidæ	2,7	1,45
Sabellidæ	0,9	0,18
Phascolosoma	1,8	0,09
Nemertini	Fragm.	1,09
Ophiopholis aculeata.	2,7	1,45
Ophioglypha albida	0,9	0,55
Astropecten Mülleri	1,8	2,82
Echinocardium flavescens.	3,6	27,45
Gammaridæ	4,5	0,18
Portunus depurator	0,9	0,64
Paguridæ	1,8	0,36
Arcturus sp.	0,9	0,09
Scalpellum sp.	3,6	0,27
Ascidiæ	7,3	2,91
Virgularia mirabilis	1,8	0,09
		57,61
		(3,65)

Deep channel between Fladen and Groves Flak.

Bottom: Brown, coarse Shell-gravel, sometimes with stones.

11 samples à 0,1 m². — Depth 24—30 meters.

1912, August 6'.

No. 26. pr. 1 m²	Number	Rough weight
Abra prismatica	7	1,20
Tellina pusilla	1	0,10
Thracia papyracea	3	0,30
Solen pellucidus	12	2,30
Psammobia færøensis	3	5,20
Venus gallina	2	5,30
Lucinopsis undata	1	0,10
Astarte Banksii	1	1,70
Cardium echinatum	1	2,00
Natica pulchella	3	0,30
Aporrhais pes pelecani	6	22,00
Turritella terebra	10	1,80
Cylichna cylindracea	3	0,30
Aricia armiger	Fragm.	0,30
Nephthys sp.	»	2,30
Ophelia limacina	42	3,00
Ammochares assimilis	Fragm.	1,20
Pectinaria auricoma	2	1,40
Pomatoceros triqueter	∞	1,20
Nemertini	»	0,10
Amphiura filiformis	3	0,60
Astropecten Mülleri	6	14,00
Asterias rubens	1	0,20
Echinocardium cordatum	4	62,10
Echinocyamus pusillus	22	0,40
Echinus miliaris	2	2,50
» esculentus	1	2,30
Gammaridæ	21	0,60
Amphioxus lanceolatus	5	1,00
		135,80
		(8,42)

7 miles N. by E. of Anholt Light.
Sand with a little ooze.
10 samples à 0,1 m². — Depth 19 meters.
1912, June 7'.

No. 30. pr. 1 m²	Number	Rough weight
Abra prismatica	1,5	0,10
Tellina fabula	1,0	0,05
» pusilla	1,5	0,10
Thracia papyracea	1,0	0,05
Mactra solida	1,5	3,60
Psammobia færøensis	0,5	1,40
Venus gallina	0,5	0,10
Astarte borealis	0,5	2,85
Cyprina islandica	Fragm.	17,50
Montacuta ferruginosa	0,5	0,05
Modiola modiolus	Fragm.	18,00
Turritella terebra	0,5	0,20
Philine sp.	0,5	0,20
Chiton sp.	1,5	0,10
Glycera sp.	2,0	0,40
Aricia armiger	1,0	0,15
Nephthys sp.	Fragm.	0,75
Ophelia limacina	6,5	0,60
Travisia Forbesi	0,5	0,10
Maldanidæ	0,5	0,15
Pectinaria auricoma	2,0	0,90
Sabellidæ	0,5	0,10
Pomatoceros triqueter	10,0	0,65
Nemertini	Fragm.	0,25
Planaria	0,5	0,10
Ophiopholis aculeata	0,5	0,50
Amphiura filiformis	0,5	0,20
Ophioglypha albida	0,5	0,10
» affinis	2,5	0,15
Spatangus purpureus	0,5	61,00
Echinocardium cordatum	3,5	70,50
» » juv.	1,0	0,50
» flavescens	0,5	6,75
Echinocyamus pusillus	14,0	0,60
Str. drøbakiensis	0,5	2,10
Synapta inhærens	0,5	0,10
Gammaridæ	13,0	0,15
Paguridæ	0,5	0,25
Amphioxus lanceolatus	2,0	0,75
		192,10
		(8,52)

From 8—16 miles S. S. W. of Anholt harbour.
Coarse, brown sand, nearly without detritus.
(St. No. 30 on the chart is at 3 places.)
20 samples à 0,1 m². — Depth 17—22 meters.
1912, June 8'.

No. 23. pr. 1 m²	Number	Rough weight
Abra prismatica	2	0,40
Macoma calcarea	2	7,40
Psammobia færøensis	1	0,30
Venus gallina	1	0,10
Cyprina islandica	2	39,20
Nucula tenuis	7	1,00
Philine sp.	1	0,10
Dentalium entalis	10	5,70
Chætoderma nitidulum	1	0,10
Aphrodite aculeata	1	3,20
Goniada maculata	2	0,30
Nephthys sp.	Fragm.	1,50
Maldanidæ	»	0,30
Pectinaria auricoma	8	1,40
Halicryptus spinulosus	1	0,10
Phascolosoma	2	0,20
Nemertini	Fragm.	0,10
Planaria	1	0,10
Ophiopholis aculeata	1	3,00
Amphiura filiformis	∞	14,40
Ophioglypha texturata	1	5,90
Echinocardium cordatum	13	70,20
» flavescens	2	29,00
Cucumaria pentactes	1	0,20
Gammaridæ	3	0,20
Eupagurus Bernhardus	1	4,00
		188,40
		(10,58)

5 miles N. by W. of Lysegrunden's Light,
Bottom: Sand and ooze.
10 samples à 0,1 m². — Depth 26 meters.
1912, Juni 6'.

No. 32. pr. 1 m²	Number	Rough weight
Abra prismatica	3,0	0,30
Macoma calcarea	8,5	8,45
Tellina fabula	3,0	0,15
Thracia prætenuis	16,0	3,25
Solen pellucidus	2,0	0,65
Psammobia færøensis	7,5	11,15
Venus gallina	4,5	2,90
Astarte Banksii	21,5	3,90
Cyprina islandica	5,0	350,00
Montacuta ferruginosa	4,0	0,15
Nucula tenuis	2,0	0,10
Natica pulchella	0,5	0,15
Turritella terebra	0,5	0,05
Phyllodoce maculata	1,0	0,20
Glycera sp.	4,0	1,00
Goniada maculata	2,0	0,40
Aricia armiger	Fragm.	0,15
Nephthys sp.	2,5	0,50
Ophelia limacina	12,5	1,00
Travisia Forbesi	3,5	1,50
Pectinaria auricoma	1,0	1,10
Nemertini	Fragm.	0,10
Ophioglypha albida	1,0	0,10
» robusta	0,5	0,05
Echinocardium cordatum	12,5	275,00
» » juv.	2,0	0,65
Echinocyamus pusillus	15,5	0,55
Str. drøbakiensis	0,5	12,70
Echinus miliaris	0,5	0,05
Gammaridæ	9,0	0,25
Actiniidæ	0,5	0,60
Amphioxus lanceolatus	1,5	0,30
		677,40
		(31.90)

Between Briseis Flak and Hastens Grund.
(3 miles S. W. by S. of Briseis buoy.)
Brown gravel with very little detritus.
10 samples à 0,1 m². — Depth 18 meters.
1912, June 27'.

No. 29. pr. 1 m²	Number	Rough weight
Macoma calcarea	10	10,90
Solen pellucidus	3	0,30
Mactra solida	6	10,70
Psammobia færøensis	1	3.40
Astarte Banksii	2	0,50
Cyprina islandica	8	225,00
Nucula tenuis	3	0,20
Harmothoe glabra	Fragm.	0,30
Glycera sp.	1	0,30
Goniada maculata	Fragm.	0,10
Ophelia limacina	7	0,50
Ammotrypane aulogaster	2	0,40
Travisia Forbesi	4	1,30
Scalibregma inflatum	1	0,20
Nemertini	Fragm.	1,20
Ophioglypha albida juv.	6	0,10
Echinocardium cordatum	30	320,00
» » juv.	16	2,40
Echinocyamus pusillus	100	6,70
Gammaridæ	4	0,10
Actiniidæ	12	0,20
Amphioxus lanceolatus	1	0,10
		584,70
		(25,51)

2,5 miles N. E. of Hjelm.
Alternately small stones and sandy bottom.
5 samples à 0,2 m². — Depth 16—18 meters.
1912, June 27'.

No. 15. pr. 1 m²	Number	Rough weight
Tellina fabula	10,4	0,480
Solen sp.	Fragm.	0,080
Mactra subtruncata juv.	0,4	0,004
Venus gallina	7,6	1,640
Montacuta ferruginosa	2,0	0,040
Natica catena	0,4	1,040
Bela turricula	0,4	0,160
Lacuna divaricata	0,4	0,004
Aricia armiger	1,2	0,062
Nephthys sp.	Fragm.	1,116
Ophelia limacina	0,8	0,062
Pectinaria Koreni	0,4	0,080
Ophioglypha texturata	0,4	0,120
Echinocardium cordatum	18,0	276,000
Gammaridæ	6,4	0,200
		281,088
		(9,360)

E. of Hulsig.
Fine sand without recognizable upper layer.
(A little growing Zostera.)
The bottom-sampler digged ca. 5cm into the bottom
25 samples à 0,1 m². — Depth 7 meters.
1911, July 7'.

No. 44 pr. 1 m²	Number	Rough weight
Tellina fabula	150	12,50
» tenuis	20	1,70
Solen ensis juv.	8	0,40
Mactra subtruncata juv.	ca. 3000	79,20
» stultorum juv.	1	0,20
Venus gallina juv.	2	0,30
Montacuta ferruginosa	3	0,10
Phyllodoce maculata	1	0,20
Nephthys sp.	Fragm.	0,80
Sigalion Mathildæ	2	1,20
Pectinaria Koreni	ca. 140	10,60
Nemertini	1	0,20
Planaria	40	4,10
Echinocardium cordatum	26	280,00
» » juv.	ca. 190	20,10
		411,60
		(18,34)

Off Aalbæk.
Pure white sand.
5 samples à 0,2 m². — Depth 4 meters.
1912, September 3'.

No. 43. pr. 1 m²	Number	Rough weight
Tellina tenuis	11	0,20
» pusilla	2	0,10
Solen ensis juv.	186	3,20
Mactra subtruncata juv.	1140	40,80
» stultorum juv.	5	0,70
Venus gallina juv.	12	12,20
Aricia armiger	Fragm.	0,30
Nephthys sp.	»	0,40
Ophelia limacina	1	0,10
Ophioglypha albida	1	0,60
» affinis	92	1,10
Echinocardium cordatum	12	101,20
» » juv.	30	2,00
Echinocyamus pusillus	10	1,00
Gammaridæ	20	1,00
Diastylis sp.	10	0,20
Amphioxus lanceolatus	1	0,10
		165,20
		(6,91)

3 miles N. by E. of Nordre Rønner.
Pure sand.
10 samples à 0,1 m². — Depth 10 meters.
1912, August 31'.

No. 21. pr. 1 m²	Number	Rough weight
Macoma calcarea	0,5	0,05
Tellina fabula	122,0	13,60
Corbula gibba	0,5	0,05
Thracia papyracea	1,0	0,10
Solen pellucidus	16,5	2,95
» ensis	1,5	0,10
Venus gallina	6,5	0,70
Cyprina islandica juv.	0,5	0,05
Axinus flexuosus juv.	1,0	0,05
Montacuta bidentata	1,0	0,05
» ferruginosa	12,5	0,35
Nucula nitida	32,5	10,35
Nassa pygmæa	2,5	0,45
Natica pulchella	1,0	0,45
» catena	0,5	1,70
Aporrhais pes pelecani	1,0	2,05
Philine aperta	13,5	0,45
Phyllodoce maculata	Fragm.	1,00
Goniada maculata	»	0,10
Aricia armiger	»	0,05
Nephthys sp.	»	3,10
Pectinaria auricoma	0,5	0,05
Nemertini	1,5	0,15
Planaria	3,0	0,50
Ophioglypha albida	9,0	4,65
» » juv.	8,5	
» affinis	0,5	
Asterias rubens	0,5	0,20
Echinocardium cordatum	51,0	675,00
» » juv.	3,5	
Gammaridæ	37,5	1,00
Eupagurus Bernhardus	0,5	0,85
Crangon vulgaris	0,5	0,15
		720,30
		(25,57)

0,7 miles E. of Middelgrunden's buoy.
S. S. W. of Læsø channel Light-vessel.
The bottom consists of sand with ooze, comparatively soft.
20 samples à 0,1 m². — Depth 12—12,5 meters.
1912, May 23'.

No. 27. pr. 1 m²	Number	Rough weight
Tellina fabula	12,0	0,70
Thracia papyracea	10,5	0,65
Solen pellucidus	1,5	0,10
Psammobia færøensis	1,0	0,10
Venus gallina	7,0	6,40
Cyprina islandica juv.	8,0	3,45
Cardium echinatum	0,5	2,95
Montacuta ferruginosa	4,5	0,20
Natica pulchella	1,0	0,10
» islandica	0,5	0,25
Turritella terebra	1,0	0,30
Cylichna cylindracea	0,5	0,05
Philine sp.	5,5	0,45
Nephthys sp.	Fragm.	2,10
Travisia Forbesi	1,0	0,35
Ophelia limacina	30,0	1,80
Pectinaria auricoma	0,5	0,25
Ophioglypha albida	1,0	0,35
» texturata	0,5	0,10
Echinocardium cordatum.	25,0	365,00
» » juv.	1,5	0,30
Echinocyamus pusillus	13,5	0,40
Gammaridæ	2,0	0,05
Amphioxus lanceolatus	5,0	1,05
		387,45
		(14,64)

Ca. 15 miles N. W. of Anholt.
Sand with a little detritus.
(St. No. 27 is on the Chart at 7 places.)
20 samples à 0,1 m². — Depth 13—18 meters.
1912, June 7'.

No. 2. pr. 1 m²	Number	Rough weight
Macoma calcarea	0,8	0,02
Tellina fabula	30,0	1,32
Corbula gibba	0,2	0,02
Solen pellucidus	1,4	0,14
Mactra subtruncata	0,2	0,02
Venus gallina	9,4	13,60
Cyprina islandica	0,2	7,30
» » juv.	ca. 14,0	
Montacuta ferruginosa	0,2	0,02
Nassa pygmæa	0,6	0,08
Natica pulchella	3,6	0,60
Bela turricula	1,2	0,14
Aporrhais pes pelecani	0,4	1,76
Phyllodoce maculata	1,0	0,21
Nephthys sp.	5,0	1,26
Ophelia limacina	10,2	0,42
Travisia Forbesi	2,6	0,21
Nemertini	0,2	0,44
Planaria	0,8	
Ophiopholis aculeata	0,2	0,04
Ophioglypha albida	2,6	0,84
Echinocardium cordatum	11,6	110,00
Echinocyamus pusillus	0,4	0,02
Gammaridæ	47,0	0,54
Paguridæ	0,6	0,02
		139,02
		(5,542)

12 miles S. E. of Muldbjergene.
Sand with a little detritus.
No vegetation.
50 samples à 0,1 m². — Depth 10—11,5 meters.
1911. May 8'.

No 3. Too stony to be valuated.
1911, May 8'.

No. 34. pr. 1 m²	Number	Rough weight
Abra nitida	17	0,50
Macoma calcarea	37	32,70
Tellina fabula	62	6,20
Thracia papyracea	2	0,30
Solen pellucidus	6	1,00
Psammobia færøensis	1	0,10
Venus gallina	2	1,70
Cyprina islandica	1	21,80
» » juv.	3	0,30
Montacuta ferruginosa	11	0,20
Nucula nitida	1	0,20
» tenuis	6	1,00
Natica pulchella	1	0,10
Phyllodoce maculata	3	1,30
Glycera sp.	2	0,20
Nephthys sp.	16	6,80
Amphiura filiformis	10	2,20
Ophioglypha albida	1	0,40
» texturata	1	0,80
Echinocardium cordatum.	13	160,00
» » juv.	3	0,60
Actiniidæ	1	0,10
		238,50
		(12,30)

6,5 miles N. of Rørvig church.
Sand with detritus.
5 samples à 0,2 m². — Depth 18 meters.
1912, June 28'.

The Kattegat. V. Stations.

No. 1. pr. 1 m²	Number	Rough weight
Tellina fabula	0,6	0,02
Mya arenaria	0,2	
Venus gallina	1,4	0,38
Montacuta bidentata	0,6	0,02
Buccinum undatum	0,2	0,22
Bela turricula	0,8	0,08
Rissoa membranacea	0,4	0,01
» rufilabris	0,2	
Polycera lineata	1,6	0,16
Harmothoë sp.	0,2	0,09
Phyllodoce maculata	Fragm.	0,04
Aricia armiger	0,8	0,05
Nephthys sp.	2,6	0,35
Ophelia limacina	7,4	0,35
Pectinaria sp.	2,0	0,56
Planaria	2,0	0,26
Ophiopholis aculeata	0,2	0,04
Ophioglypha albida	60,2	12,30
Asterias rubens	0,6	0,20
Echinocyamus pusillus	1,0	0,08
Gammaridæ	2,6	0,06
Diastylis sp.	1,0	0,02
Mysidæ	0,6	0,02
Carcinus mænas	0,2	4,20
		19,51
		(1,254)

5 miles S. E. of Muldbjergene.
Hard sandy bottom. (37 samples on Zostera, 13 on pure sand.)
50 samples à 0,1 m². — Depth 6—8 meters.
1911, May 8'.

No. 38. pr. 1 m²	Number	Rough weight
Tellina fabula	14	1,60
» tenuis	13	0,80
Mactra subtruncata	9	1,10
» » juv.	20	0,20
Venus gallina	11	3,80
Cyprina islandica	1	54,20
» » juv.	4	0,50
Philine sp.	2	0,20
Goniada maculata	1	0,10
Aricia armiger	Fragm.	1,20
Nephthys sp.	»	5,90
Pectinaria Koreni	6	3,10
		72,70
		(5,44)

2,5 miles N. of Raageleje.
Hard Sand, a single Furcellaria.
10 samples à 0,1 m². — Depth 14 meters.
1912, August 14'.

The Kattegat. d. Stations and allied, poor Stations.

No. 12. pr. 1 m²	Number	Rough weight
Abra (alba?)	0,4	0,04
Macoma baltica	0,8	0,04
Mya (Siphon)	0,4	0,12
Tapes sp.	0,8	0,04
Cardium exiguum	2,8	0,04
Mytilus edulis	0,4	0,08
Nassa reticulata	7,6	8,04
Littorina littorea	6,4	26,52
Lacuna divaricata	0,4	0,04
Rissoa membranacea	3,6	0,08
Aricia armiger	1,6	0,04
Nephthys sp.	Fragm.	0,36
Asterias rubens	2,0	1,08
Gammaridæ	1,6	0,12
Carcinus mænas	0,8	
Idothea sp.	0,4	
Ascidiæ	+	0,08
		36,72
		(2,292)

S. E. of Læsø (Mellemflakket).
Pure sand with Zostera (short) in each sample.
25 samples à 0,1 m². — Depth 3,25 meters.
1911, June 22'.

No. 37. pr. 1 m²	Number	Rough weight
Macoma baltica	1	0,30
Tellina tenuis	24	1,30
Mactra subtruncata juv...	280	2,20
Aricia armiger	8	1,20
Nephthys sp.	2	0,10
Ophelia limacina	1	0,10
Nemertini	2	0,20
Gastrosaccus spinifer	2	0,10
		5,50
		(0,58)

Ca. 4 miles W. of Gilbjerghoved.
Hard, light sand with round stones.
10 samples à 0,1 m². — Depth 6—8 meters.
1912, August 15'.

No. 28. pr. 1 m²	Number	Rough weight
Phyllodoce maculata	1	0,80
Aricia armiger	Fragm.	0,10
Nephthys sp.	7	2,70
Ophelia limacina	6	2,00
Travisia Forbesi.....	4	1,80
Gastrosaccus spinifer	1	0,10
		7,50
		(1,49)

4 miles N. W. by W. of Anholt harbour.
Pure white sand.
10 samples à 0,1 m². — Depth 8 meters.
1912, June 7'.

No. 39 pr. 1 m²	Number	Rough weight
Nassa pygmæa	1	0,20
Littorina littorea	5	0,50
Lacuna divaricata	1	0,10
Harmothoë imbricata	1	0,10
Nephthys sp.	3	0,80
Travisia Forbesi.....	1	0,10
Asterias rubens	5	0,60
Gammaridæ.....	1	0,10
Gastrosaccus spinifer	1	0,10
		2,60
		(0,30)

3 miles N. N. W. of Rørvig church.
Small stones with gravel and sand; in 1 sample Fucus, 1 sample Zostera.
5 samples à 0,2 m². — Depth 11 meters.
1912, August 16'.

Samsø-Belt. Continuation of the reduced (E. T.) Stations with rich influence of R. M.

No. 21. pr. 1 m²	Number	Rough weight
Macoma calcarea	6	8,30
Mya sp.	2	0,20
Solen pellucidus	1	0,20
Psammobia færøensis	1	0,10
Astarte Banksii	12	5,00
» borealis	1	0,50
Cyprina islandica	1	7,70
Cardium fasciatum	8	0,90
Leda minuta	4	0,40
Nucula nucleus	16	1,80
» tenuis	1	0,20
Modiola modiolus	3	136,50
» » juv.	2	0,30
Neptunea antiqua	1	0,40
Buccinum undatum	2	2,10
Trochus cinerareus	2	0,60
Acmæa testudinalis	16	0,20
Philine aperta	2	0,60
Chiton sp.	142	7,70
Lepidonotus squamatus	6	3,40
Glycera sp.	Fragm.	0,10
Nephthys sp.	»	8,20
Travisia Forbesi	2	0,50
Trophonia sp.	3	1,60
Maldanidæ	Fragm.	0,10
Pectinaria auricoma	11	3,20
Terebellidæ	Fragm.	3,10
Sabellidæ	1	0,40
Pomatoceros triqueter	∞	3,85
Planaria	3	0,50
Ophiopholis aculeata	∞	13,40
Amphiura filiformis	+	2,70
Ophioglypha albida	10	0,60
» robusta	168	6,30
Echinocardium cordatum	4	19,70
Echinocyamus pusillus	33	1,20
Str. drøbakiensis	34	36,70
Psolus phantapus	12	37,80
Gammaridæ	5	0,20
Balanidæ	2	10,90
Actiniidæ	1	0,40
		328,55
		(26,65)

7 miles N. N. W. of Sejerø Light.
Coarse gravel with sand, clay and small stones.
10 samples à 0,1 m². — Depth 18 meters.
1911, August 2'. Temp. 10,3° C.

No. 22. pr. 1 m²	Number	Rough weight
Astarte borealis	16	2,60
» elliptica	8	2,70
Cyprina islandica	1	109,10
Cardium fasciatum	1	0,20
Leda minuta	15	1,90
Nucula nucleus	82	20,80
» tenuis	2	0,40
Modiola modiolus	278	3080,00
Lima Loscombii	1	0,60
Pecten septemradiatus	1	0,60
Trochus cinerareus	2	0,20
Chiton sp.	3	0,20
Lepidonotus squamatus	14	7,40
Lumbrinereis fragilis	1	1,75
Glycera sp.	2	1,75
Nephthys sp.	Fragm.	7,00
Trophonia sp.	30	17,00
Maldanidæ	Fragm.	0,10
Ampharetidæ	2	0,10
Terebellidæ	Fragm.	1,20
Ophiopholis aculeata	∞	480,00
Amphiura filiformis	1	0,20
Ophioglypha robusta	65	3,50
Echinocyamus pusillus	2	0,30
Str. drøbakiensis	4	13,90
		3753,50
		(222,96)

2,5 miles N. W. ½ W. of Sjællands Reef Light.
Gravel, sand and clay with large quantities of dead shells (Pecten, Nucula, Astarte a. o.), forming a thick layer upon the bottom. — Great, coherent masses of Modiola in all the samples.
No distinct brown layer.
10 samples à 0,1 m². — Depth 38—42 meters.
Temp. 8,6° C.
1911, August 2'

No. 23. pr. 1 m²	Number	Rough weight
Abra alba	1	0,40
» nitida	2	0,10
Mya sp.	2	0,05
Cyprina islandica juv.	3	1,20
Cardium minimum	4	0,05
Leda minuta	13	0,70
Nucula tenuis	5	0,50
Modiolaria nigra	1	0,10
Modiola modiolus	5	143,00
Aporrhais pes pelecani	2	9,20
Turritella terebra	4	0,60
Tectura virginea	2	0,20
Chiton sp.	1	0,10
Lepidonotus squamatus	1	0,80
Glycera sp.	Fragm.	3,65
Nephthys sp.	»	10,95
Trophonia plumosa	1	0,90
Maldanidæ	Fragm.	1,00
Pectinaria belgica	10	6,10
Ampharetidæ	1	0,10
Terebellidæ	Fragm.	2,50
Sabellidæ	2	0,40
Pomatoceros triqueter	Fragm.	4,30
Ophiopholis aculeata	∞	11,30
Amphiura filiformis	»	14,80
Ophioglypha texturata	1	2,40
» robusta	11	0,60
Echinocardium cordatum	12	110,00
Psolus phantapus	3	45,50
Gammaridæ	16	0,40
Diastylis sp.	7	0,20
Virgularia mirabilis	Fragm.	2,00
Actiniidæ	1	0,10
		374,20
		(31,66)

6 miles E. by S. of Hjelm Light.
1 sample with Modiola in a cluster and small stones. The rest dark, sandy clay with brown layer.
10 samples à 0,1 m². — Depth 22 meters.
Temp. 9,2° C.
1911, August 2'.

No. 5. pr. 1 m²	Number	Rough weight
Astarte elliptica	18	13,60
Cyprina islandica	Fragm.	8,50
» » juv.	1	0,10
Montacuta ferruginosa	1	0,10
Leda minuta	12	1,00
Nucula nucleus	15	2,30
» tenuis	2	0,40
Modiola modiolus	48	915,00
Buccinum undatum	1	0,40
Natica grønlandica	1	0,30
Chiton sp.	5	0,40
Aphrodite aculeata	1	1,80
Lepidonotus squamatus	6	3,70
Lumbrinereis fragilis	Fragm.	4,00
Glycera sp.	1	0,60
Goniada maculata	2	0,60
Trophonia sp.	20	21,20
Maldanidæ	Fragm.	1,60
Pectinaria auricoma	2	0,90
Ampharetidæ	1	0,10
Terebellidæ	6	1,60
Ophiopholis aculeata	∞	370,00
Amphiura filiformis	»	5,40
Ophioglypha robusta	»	9,20
Echinocardium cordatum.	5	60,00
Str. drøbakiensis	7	135,00
Isopoda	2	0,10
		1557,90
		(82,41)

E. S. E. of Hatterevs buoy.
Coarse gravel with clay, small stones and slight brown layer.
Many dead shells.
2 of the samples: pure black sand, nearly without animals.
10 samples à 0,1 m². — Depth 47—53 meters.
Temp. 8,2° C.
1911, July 28'.

No. 6. pr. 1 m²	Number	Rough weight
Cyprina islandica	2	67,80
Leda pernula	2	1,00
» minuta	2	0,80
Aphrodite aculeata	1	8,00
Phyllodoce maculata	1	0,10
Nephthys sp.	Fragm.	7,60
Maldanidæ	1	0,20
Ampharetidæ	2	
Amphiura filiformis	∞	3,80
Ophioglypha albida	»	8,90
Echinocardium cordatum.	8	38,80
Str. drøbakiensis	5	85,00
Psolus phantapus	1	0,50
Gammaridæ	14	1,20
		223,70
		(10,51)

E. S. E. of Hatterevs buoy.
Dark sand covered with a slight brown layer. — The bottom-sampler digged ca. 8 cm into the bottom.
10 samples à 0,1 m². — Depth 32—34 meters.
Temp. 9,0° C.
1911, July 28'.

No. 9. pr. 1 m²	Number	Rough weight
Abra alba	1	0,10
» nitida	6	0,20
Astarte borealis	2	0,50
Cardium sp.	1	0,10
Leda minuta	6	0,20
Modiolaria nigra	2	1,30
Nassa pygmæa	1	0,10
Nephthys sp.	Fragm.	3,00
Pectinaria sp.	2	2,10
Terebellidæ	∞	4,20
Amphiura filiformis	25	2,20
Ophioglypha albida	9	1,40
Echinocardium cordatum.	5	54,70
Psolus phantapus	17	325,00
Gammaridæ	6	0,30
Virgularia mirabilis	2	0,10
		395,50
		(74,64)

1,5 miles S. by E. of Sletterhage Light.
Dark sand-mixed detritus with small stones.
10 samples à 0,1 m². — Depth 28 meters.
Temp. 9,4° C.
1911, July 29'.

Samsø-Belt. Rich E. b. c. Stations.

No. 10. pr. 1 m²	Number	Rough weight
Abra nitida	1	1,00
Cyprina islandica juv.	1	0,30
Cardium minimum	1	0,01
Leda pernula	7	0,70
» minuta	7	0,50
Nucula tenuis	1	0,01
Modiola modiolus	20	1100,00
Buccinum undatum	1	16,60
Philine sp.	1	0,10
Chiton sp.	1	0,10
Aphrodite aculeata	1	3,00
Lumbrinereis fragilis	Fragm.	0,70
Glycera sp.	»	0,70
Nephthys sp.	»	2,90
Trophonia sp.	14	11,00
Maldanidæ	Fragm.	0,62
Terebellidæ	»	2,48
Ophiopholis aculeata	∞	44,30
Amphiura filiformis	»	12,20
Ophioglypha albida	18	1,00
» robusta	11	0,10
Echinocardium cordatum.	38	190,00
Str. drøbakiensis	5	18,50
Psolus phantapus	3	8,70
Gammaridæ	2	0,10
Alcyonium digitatum	3	22,40
		1438,02
		(88,47)

1,5 miles S. S. E. of Sletterhage Light.
Dark sand-mixed detritus with small stones.
10 samples à 0,1 m². — Depth ca. 40 meters.
Temp. 9,4° C.
1911, July 29'.

No. 3. pr. 1 m²	Number	Rough weight
Abra alba 5-20 mm	33,5	10,50
» nitida 9-12 mm	17,5	5,20
Macoma calcarea 9-23 mm	5,0	0,40
Mya sp.	0,5	0,05
Corbula gibba	0,5	0,05
Mactra subtruncata 5 mm.	4,0	0,15
Astarte Banksii	2,0	0,60
» elliptica	0,5	0,05
Cyprina islandica	0,5	26,10
» » juv.	2,0	0,20
Cardium echinatum	1,5	11,75
» fasciatum	0,5	0,05
Axinus flexuosus	3,0	0,10
Montacuta ferruginosa	2,5	0,05
Leda pernula 9-30 mm	11,0	7,50
» minuta 9-15 mm	7,5	1,10
Nucula tenuis	63,0	6,50
Modiolaria nigra	0,5	0,10
Natica sp.	1,0	0,80
Bela turricula	0,5	0,05
Enipo Kinbergi	Fragm.	1,34
Phyllodocidæ	»	6,67
Lumbrinereis fragilis	»	
Glycera sp.	0,5	
Nephthys sp.	Fragm.	5,34
Maldanidæ	»	0,70
Ampharetidæ	0,5	0,05
Terebellidæ	Fragm.	0,75
Balanoglossus Kuppferi	»	0,70
Nemertini	»	0,70
Amphiura filiformis	5,0	0,45
Ophioglypha albida	∞	4,00
» texturata	1,5	2,65
» robusta	3,0	0,10
Echinocardium cordatum.	25,0	262,50
Gammaridæ	2,0	0,10
Diastylis sp.	1,0	0,10
Crangon Allmani	0,5	0,15
Virgularia mirabilis	Fragm.	1,00
Actiniidæ	0,5	0,15
		358,75
		(16,805)

4 miles E. 1/4 S. of Lillegrunden's Light buoy.
Dark detritus with small stone and sand, together with clay in the 4 last samples. — The bottom-sampler digged 8—13 cm into the bottom.
20 samples à 0,1 m². — Depth 38—42 meters.
1911, July 27'. Temp. 8,4° C.

No. 4. pr. 1 m²	Number	Rough weight
Abra alba > 6 mm	84,0	24,96
» nitida	1,2	0,08
Macoma calcarea > 7 mm	37,2	13,68
Corbula gibba	0,4	0,04
Solen pellucidus	0,4	0,04
Cyprina islandica juv.	0,8	0,84
Cardium fasciatum	0,8	0,04
Leda pernula < 25 mm.	2,0	1,44
Crenella decussata	0,4	0,004
Nucula tenuis 3-10 mm	4,8	0,52
Modiolaria nigra < 23 mm	3,4	1,64
Nephthys sp.	Fragm.	15,84
Polychæta varia	»	5,28
Maldanidæ	»	4,48
Ophioglypha albida > 11 mm	∞	7,04
Echinocardium cordatum.	0,8	14,60
Gammaridæ	2,0	0,04
Dystialis sp.	1,2	0,04
		90,604
		(9,48)

3 miles E. N. E. of »Einsidelsborg«.
Light sand-mixed detritus with distinct brown layer. — The bottom-sampler digged ca. 8 cm into the bottom.
25 samples à 0,1 m². — Depth 19—20 meters.
Temp. 8,4° C.
1911, July 28'.

No. 7. pr. 1 m²	Number	Rough weight
Macoma calcarea	43	13,80
Mya sp.	17	0,80
Corbula gibba	1	0,01
Venus gallina	2	0,60
Astarte Banksii juv.	45	2,00
» borealis juv.		
» »	1	7,70
Cyprina islandica	Fragm.	2,00
» » juv.	3	0,01
Cardium fasciatum	2	0,10
Nucula tenuis	4	0,10
Hormothoë imbricata	3	0,40
Nephthys sp.	Fragm.	12,25
Pholoë minuta	1	
Phyllodoce maculata	1	
Glycera sp.	1	0,65
Ophelia limacina	2	
Travisia Forbesi	1	
Pectinaria Koreni	2	1,80
Terebellides Strømi	Fragm.	1,70
Planaria	7	0,50
Ophioglypha albida	116	7,80
Echinocardium cordatum	5	16,50
Echinocyamus pusillus	52	1,90
Str. drøbakiensis	5	5,80
Gammaridæ	∞	1,50
		77,92
		(6,31)

2 miles E. by N. of Ballen.
Dark sand-mixed detritus with gravel.
The bottom-sampler digged ca. 6 cm into the bottom.
10 samples à 0,1 m². — Depth 13—17 meters
1911, July 29'.

No. 15. pr. 1 m²	Number	Rough weight
Abra alba 9-12 mm	256	114,10
» nitida	4	0,10
Macoma calcarea 5-25 mm	40	5,90
Corbula gibba	1	0,10
Cyprina islandica juv.	1	0,50
Nucula tenuis	18	0,60
Buccinum undatum 9 mm	1	0,20
Aporrhais pes pelecani	2	4,80
Nephthys sp.	Fragm.	17,00
Maldanidæ	»	0,40
Terebellides Strømi	»	0,70
Ophioglypha albida	4	0,10
» texturata	3	1,80
Asterias rubens	1	8,40
Echinocardium cordatum 9-25 mm	6	13,20
Gammaridæ	1	0,01
Diastylis sp.	1	0,01
		167,92
		(15,07)

4 miles S. E. by E. of Aarhus.
Dark sand-mixed detritus with distinct brown layer.
10 samples à 0,1 m². — Depth 14,5 meters.
Temp. 10,4° C.
1911, July 31'.

No. 20. pr. 1 m²	Number	Rough weight
Abra alba 5-15 mm	26	4,10
» nitida	20	1,40
Macoma calcarea 3-29 mm	157	86,60
Mya sp.	5	0,10
Corbula gibba	1	0,10
Solen pellucidus 30 mm	1	0,80
Venus gallina 7 mm	1	0,20
Astarte Banksii	27	3,10
Cardium fasciatum	14	0,30
Nucula tenuis 3-9 mm	67	4,70
Modiolaria nigra	1	0,10
Neptunea antiqua	1	44,90
Aporrhais pes pelecani	2	9,80
Phyllodoce maculata	Fragm.	9,80
Nephthys sp.	»	19,60
Maldanidæ	»	0,40
Terebellides Strømi	»	1,30
Nemertini	1	3,30
Ophioglypha albida	15	1,90
» texturata	1	1,90
Gammaridæ	32	0,50
Idothea sp.	1	0,10
		195,00
		(21,63)

5 miles N. E. by E. of Sejerø Light.
Light, clay- and sand-mixed detritus with brown layer.
10 samples à 0,1 m². — Depth 18 meters.
Temp. 10,1° C.
1911, August 1'.

No. 25. pr. 1 m²	Number	Rough weight
Abra alba 7-20 mm	84,0	34,75
» nitida	0,5	0,05
Macoma calcarea 12-30 mm	12,5	19,15
Corbula gibba	1,0	0,05
Astarte elliptica	0,5	0,05
Cyprina islandica juv.	0,5	0,05
Leda pernula	10,0	4,40
Nucula tenuis	31,5	2,45
Neptunea antiqua	0,5	3,65
Natica grønlandica	1,5	0,35
Nephthys sp.	Fragm.	13,15
Maldanidæ	»	0,05
Ophioglypha albida	∞	4,75
Echinocardium cordatum	8,5	120,00
Gammaridæ	0,5	0,05
Diastylis sp.	2,5	0,05
		202,95
		(12,23)

3,5 miles N. E. ½ E. of Æbelø Light.
Black, loose detritus with very little sand; light upper layer.
20 samples à 0,1 m². — Depth 22 meters.
Temp. 8,6° C.
1911, August 3'.

No. 26. pr. 1 m²	Number	Rough weight
Abra alba 8-20 mm	128,0	63,00
Macoma calcarea 6-30 mm	21,5	21,70
Corbula gibba	0,5	0,05
Cyprina islandica juv.	1,5	0,20
Montacuta sp.	0,5	0,05
Leda pernula	0,5	0,05
Nucula tenuis	10,0	0,90
Phyllodoce maculata	Fragm.	1,03
Nephthys sp.	»	9,27
Terebellides Strømi	2,0	0,10
Ophioglypha albida	∞	5,60
Echinocardium cordatum	5,5	75,00
Diastylis sp.	5,0	0,10
		177,05
		(11,95)

4,5 miles W. ½ N. of Æbelø Light.
Black detritus, loose and with very little sand. Light upper layer with some dead Zostera and many dead Abra-shells.
20 samples à 0,1 m². — Depth 17—18 meters.
Temp. 9,8° C.
1911, August 3'.

No. 27a. pr. 1 m²	Number	Rough weight
Abra alba < 20 mm	431,0	207,50
» » juv. < 5 mm	11,5	0,15
» nitida	7,0	0,40
Macoma calcarea < 35 mm	178,5	305,00
» » juv. > 7 mm	23,0	1,15
Solen pellucidus	0,5	0,05
Mactra subtruncata	2,0	0,10
Cyprina islandica juv.	2,0	0,20
Cardium fasciatum	1,5	0,20
Montacuta ferruginosa	1,5	0,05
Leda pernula	6,5	1,30
Nucula tenuis	60,0	4,35
Modiolaria sp.	0,5	0,005
Phyllodoce maculata	0,5	0,95
Nephthys sp.	Fragm.	18,10
Terebellides Strømi	1,0	0,05
Ophioglypha albida	∞	5,10
» texturata	0,5	1,30
Echinocardium cordatum	14,0	185,00
Gammaridæ	0,5	0,05
Diastylis sp.	2,5	0,05
		731,055
		(55,935)

0,8 miles N. E. of Lillegrunden's Light-buoy.
Black, loose detritus nearly without sand, with light, brown upper layer. — Many dead shells of Abra, Macoma, Nucula etc.
20 samples à 0,1 m². — Depth 35—40 meters.
Temp. 8,5° C.
1911, August 3'.

Samsø-Belt. Poor E. a. b. c. Stations.

No. 27b. pr. 1 m²	Number	Rough weight
Abra alba	210	114,50
» nitida	17	2,80
Macoma calcarea	182	500,00
» » juv.	35	9,00
Corbula gibba	1	0,10
Cyprina islandica	5	2,60
Cardium fasciatum	1	0,10
Axinus flexuosus	3	0,20
Montacuta ferruginosa	1	0,10
Leda perdula	8	3,00
» minuta	1	0,10
Nucula tenuis	156	8,50
Modiolaria nigra	3	0,40
Buccinum undatum	1	0,10
Nephthys sp.	Fragm.	23,50
Terebellides Strømi	2	0,40
Nemertini	1	0,80
Ophioglypha albida	114	5,60
Echinocardium cordatum.	18	300,00
» » juv..	6	
		971,80
		(72,66)

Lillegrunden.
Soft, black mud with many dead shells, especially of Nucula.
10 samples à 0,1 m². — Depth 33 Meters.
1912, May 2'.

No. 1. pr. 1 m²	Number	Rough weight
Macoma calcarea	6,8	3,32
Mya sp.	2,0	0,04
Solen pellucidus	2,0	0,72
Venus gallina	2,0	0,16
Astarte Banksii	74,4	11,20
» elliptica	1,6	0,60
Cyprina islandica	2,0	50,00
» » juv.	4,4	2,72
Cardium fasciatum	2,8	0,44
Montacuta ferruginosa	0,4	0,04
Nucula tenuis	2,0	0,20
Buccinum undatum	0,8	0,44
Natica sp.	0,4	0,04
Aporrhais pes pelecani	0,4	1,40
Philine aperta	0,4	0,08
Chiton marmoreus	4,8	0,44
» cinereus	4,0	
Lumbrinereis fragilis	0,4	0,07
Goniada maculata	0,4	0,07
Nephthys sp.	Fragm.	6,78
Maldanidæ	»	0,32
Pectinaria auricoma	0,4	0,20
Terebellidæ	Fragm.	2,80
Serpulidæ	Fragm.	0,24
Planaria	2,8	0,36
Ophioglypha albida	54,0	3,80
» texturata	2,8	1,40
» robusta	7,2	0,80
Asterias rubens	0,4	0,04
Echinocardium cordatum.	19,6	200,00
Echinocyamus pusillus	2,0	0,36
Str. drøbakiensis	8,8	50,00
Phyllophorus pellucidus	0,4	1,24
Gammaridæ	20,0	0,84
Virgularia mirabilis	2,0	0,44
Ascidiæ	0,4	0,12
Actiniidæ	0,4	0,12
		341,84
		(14,112)

3,5 miles E. N. E. of Ballen.
Dark gravel and sand mixed detritus with distinct brown layer. — The first 5 samples small stones.
Rapid southern current. — The bottom-sampler digged ca. 7 cm into the bottom.
25 samples à 0,1 m². — Depth 18—20 meters.
1911, July 26'. Temp. 8,6° C.

No. 2. pr. 1 m²	Number	Rough weight
Mactra solida	4	7,10
Astarte borealis	4	8,70
Cardium fasciatum	4	0,20
Nucula tenuis	1	0,10
Natica islandica	3	0,70
Harmothoë sp.	1	0,10
Phyllodoce sp.	Fragm.	0,64
Nephthys sp.	»	1,48
Ophelia limacina	9	1,40
Gephyrea	35	1,60
Ophioglypha albida	6	1,30
Echinocyamus pusillus	205	7,50
Str. drøbakiensis	25	21,90
Gammaridæ	21	0,40
		53,20
		(2,44)

3,5 miles W. N. W. of Refsnæs.
Coarse gravel with small stones without distinct brown layer. — The bottom-sampler digged ca. 5 cm into the bottom.
Many dead, large Cyprina. — Rapid southern current.
10 samples à 0,1 m². — Depth 16—19 Meters.
1911, July 27'.

No. 11. pr. 1 m²	Number	Rough weight
Abra alba	2	0,10
» nitida	1	0,10
Macoma calcarea	1	0,10
Cyprina islandica	1	6,20
» » juv.	1	0,10
Montacuta ferruginosa	1	0,10
Leda pernula	2	0,10
Nucula tenuis	1	0,20
Nephthys sp.	Fragm.	15,00
Maldanidæ	»	0,75
Pectinaria auricoma	1	0,20
Terebellidæ	Fragm.	0,75
Ophioglypha albida	26	2,50
» texturata	2	2,50
Echinocardium cordatum.	19	250,00
» » juv..	10	9,60
Virgularia mirabilis	6	0,30
		288,60
		(12,27)

3 miles W. by N. of Sletterhage Light.
Very dark, soft and sand-mixed detritus.
Some of the samples were smelling.
10 samples à 0,1 m². — Depth 22 meters.
Temp. 9,4° C.
1911, July 29'.

No. 13 pr. 1 m²	Number	Rough weight
Abra alba	4	0,60
Macoma calcarea	10	5,36
» baltica	1	0,54
Corbula gibba	1	0,10
Solen pellucidus	2	0,90
Nassa reticulata	1	0,10
Nephthys sp.	Fragm.	2,20
Ophioglypha albida	8	2,70
» texturata	1	1,10
Echinocardium cordatum.	9	4,40
Gammaridæ	2	0,01
Diastylis sp.	12	0,30
		18,31
		(1,39)

3,5 miles W. S. W. of Kalø Castle-ruin.
Black, granulous, a little sandy detritus with destinct brown layer.
10 samples à 0,1 m². — Depth 15 meters.
Temp. 10,4° C.
1911, July 31'.

No. 14. pr. 1 m²	Number	Rough weight
Abra alba	10	4,30
» » juv.	70	0,50
Macoma calcarea	8	1,60
Cyprina islandica	2	48,50
» » juv.	1	0,10
Aporrhais pes pelecani	1	2,50
Philine sp.	1	0,10
Nephthys sp.	Fragm.	7,30
Ophioglypha albida	6	0,50
Echinocardium cordatum.	18	275,50
Gammaridæ	1	0,01
Diastylis sp.	1	0,01
		340,92
		(13,70)

1,5 miles S. E. by E. of Aarhus.
Dark sand-mixed detritus with distinct brown layer.
10 samples à 0,1 m². — Depth 13 meters.
Temp. 11,8° C,
1911, July 31'.

No. 16. pr. 1 m²	Number	Rough weight
Abra alba	17	11,80
Macoma calcarea	17	4,70
Nucula tenuis	2	0,10
Aporrhais pes pelecani	1	4,00
Nephthys sp.	Fragm.	16,80
Cirratulus sp.	1	0,10
Maldanidæ	Fragm.	0,10
Terebellidæ	»	0,60
Ophioglypha albida	11	0,10
» texturata	8	6,00
Echinocardium cordatum.	16	102,00
Str. drøbakiensis	1	6,30
Gammaridæ	18	0,20
Diastylis sp.	8	0,10
Virgularia mirabilis	2	0,10
		153,00
		(8,87)

4,5 miles N. N. W. of Tunø Light.
Dark, sandy detritus with some dead Zostera, especially in 2 samples.
10 samples à 0,1 m². — Depth 15 meters.
Temp. 10,4° C.
1911, July 31'.

No. 17. pr. 1 m²	Number	Rough weight
Abra nitida	12	0,80
Macoma calcarea	28	1,50
Mya sp.	2	0,10
Corbula gibba	2	0,10
Solen pellucidus	6	2,00
Astarte Banksii	95	24,20
» borealis	3	2,00
Cyprina islandica	Fragm.	5,50
» » juv.	3	0,20
Cardium minimuum	6	0,10
» fasciatum	8	0,10
Leda pernula	9	1,00
Nucula tenuis	8	0,40
Lepidonotus squamatus	Fragm.	0,40
Enipo Kinbergi	1	0,10
Phyllodoce maculata	2	
Lumbrinereis fragilis	1	0,50
Goniada maculata	1	
Nephthys sp.	Fragm.	9,50
Maldanidæ	»	0,50
Terebellidæ	»	0,50
Ophioglypha albida	29	1,10
» robusta	2	0,10
» affinis	9	0,30
Echinocardium cordatum.	2	20,10
Gammaridæ	105	4,00
Diastylis sp.	5	0,10
Virgularia mirabilis	8	0,80
		76,00
		(5,10)

4 miles N. E. by N. of Refsnæs Light.
Light detritus, mixed with sand and clay, with brown layer.
10 samples à 0,1 m². — Depth 23 meters.
Temp. 9,2° C.
1911, August 1'.

No. 24. pr. 1 m²	Number	Rough weight
Abra nitida	4	0,10
Macoma calcarea	13	0,30
Solen pellucidus	2	1,80
Montacuta ferruginosa	4	0,10
Nucula tenuis	1	0,10
Aporrhais pes pelecani	1	0,60
Goniada maculata	1	0,40
Aricia armiger	Fragm.	0,40
Nephthys sp.	»	3,40
Terebellidæ	»	0,20
Planaria	1	0,20
Amphiura filiformis	Fragm.	0,50
Ophioglypha albida	11	0,20
» texturata	10	7,40
Echinocardium cordatum.	30	250,00
Gammaridæ	4	0,10
		265,80
		(9,55)

4 miles E. of Issehoved.
Dark sand with a ca. 2 cm thick, light upper layer of sand and very little detritus.
10 samples à 0,1 m². — Depth 16 meters.
Temp. 11,5° C.
1911, August 2'.

No. 30. pr. 1 m²	Number	Rough weight
Abra alba	233	120,00
Macoma calcarea	18	22,40
» baltica	1	0,60
Nucula tenuis	13	0,90
Philine sp.	1	0,20
Nereis sp.	1	0,10
Spionidæ	Fragm.	0,20
Nephthys sp.	»	2,60
Ophioglypha albida	21	2,80
Echinocardium cordatum juv.	1	0,10
Diastylis sp.	2	0,20
		150,10
		(12,74)

S. of the buoy by Bjørnsknude.
Black, quivering mud.
10 samples à 0,1 m². — Depth 21 meters.
1912, June 26'.

No. 8. pr. 1 m²	Number	Alcohol weight
Macoma calcarea	1	0,10
Mya sp.	1	0,10
Cardium sp.	1	0,01
Bela turricula	1	0,20
Littorina littorea	1	0,02
Lacuna divaricata	1	0,02
Harmothoë sp.	1	0,10
Aricia armiger	Fragm.	0,60
Nephthys sp.	»	1,60
Ophelia limacina	4	0,10
Ophioglypha albida	1	0,10
Asterias rubens	1	0,10
Echinocyamus	1	0,01
Gammaridæ	2	0,10
Gastrosaccus spinifer	2	0,10
		3,26
		(0.54)

1 mile N. N. E. of Ballen.
Pure white sand with green Zostera.
10 samples à 0,1 m². — Depth 9—10 meters.
1911, July 29'.

No. 12. pr. 1 m²	Number	Rough weight
Abra alba	2	1,20
Macoma baltica	38	12,10
Modiolaria discors	1	0,40
Acera bullata	2	0,70
Arenicola marina	1	3,00
Pectinaria Koreni	4	2,50
Asterias rubens	1	0,30
Echinus miliaris	2	0,60
Diastylis sp.	1	0,10
		20,90
		(1,86)

1,5 miles W. of Kalø Castle-ruin.
Black mud (slight smelling) with dead Zostera and green Zostera.
10 samples à 0,1 m². — Depth 9 meters.
Temp. 13,4° C.
1911, July 31'.

No. 18. pr. 1 m²	Number	Rough weight
Abra alba	10,0	0,500
Macoma baltica 3-12 mm	141,0	8,350
Mya sp.	0,5	0,025
Corbula gibba	4,0	0,100
Solen pellucidus	0,5	0,050
Cardium sp.	1,0	0,025
Mactra subtruncata	0,5	0,050
Cyprina islandica 9-17 mm	1,0	0,600
Montacuta sp.	1,0	0,025
Mytilus edulis	0,5	0,050
Nassa reticulata	1,5	0,850
Utriculus obtusus	0,5	0,050
Nephthys sp.	Fragm.	1,800
Ophelia limacina	5,5	0,200
Gammaridæ	4,5	0,050
Diastylis sp.	2,0	0,025
		12,750
		(0,99)

3 miles N. W. $^1/_2$ N. of Vrøj mill (Saltbækvig).
Pure sand with green Zostera.
The bottom-sampler digged ca. 5 cm into the bottom.
20 samples à 0,1 m². — Depth 12 meters.
Temp. 17,2° C.
1911, August 1'.

No. 19. pr. 1 m²	Number	Rough weight
Macoma baltica 3-12 mm	72,0	4,30
Mya sp.	2,5	0,15
Cardium edule < 13 mm.	32,0	4,40
Mytilus edulis	27,0	70,00
Nassa reticulata	11,5	6,00
Littorina littorea	5,5	5,40
» » juv.	6,0	0,15
Lacuna divaricata	2,5	0,05
Hydrobia ulvæ	9,5	0,05
Phyllodoce maculata	Fragm.	0,12
Aricia armiger	»	0,03
Nephthys sp.	»	0,25
Gammaridæ	1,0	0,05
Idothea sp.	1,5	0,05
Diastylis sp.	1,0	0,05
		91,05
		(3,265)

3 miles E. N. E. of Ordrup Næs (Sejerø bay).
Pure sand wiht green Zostera.
The bottom-sampler digged 3—6 cm into the bottom.
20 samples à 0,1 m². — Depth 8 meters.
Temp. 18,5° C.
1911, August 1'.

No. 28. pr. 1 m²	Number	Rough weight
Macoma baltica	1	0,10
Tellina tenuis	5	0,60
Mya sp.	2	0,30
Cardium edule (28-29 mm)	2	12,30
» » (4-15 mm).	243	66,00
Aricia armiger	Fragm.	0,30
Nephthys sp.	8	1,70
Gastrosaccus spinifer	1	0,10
		81,40
		(6,41)

E. of Havnehage on Samsø.
Pure, fine, white sand without vegetation.
10 samples à 0,1 m². — Depth 5,5 meters.
1912, May 10'.

Great Belt. a. b. c. Stations influenced by R. M.

No. 29. pr. 1 m²	Number	Rough weight
Tellina tenuis	78	3,80
Lumbrinereis fragilis	1	0,20
Spionidæ	2	0,20
Aricia armiger	Fragm.	2,80
Nephthys sp.	»	0,40
Ophelia limacina	34	2,80
Travisia Forbesi	16	1,80
Maldanidæ	1	0,10
Ophioglypha albida	1	0,10
		12,20
		(1,97)

E. of Pughavn on Fynshoved.
Pure sand.
5 samples à 0,2 m². — Depth 4 meters.
1912, June 24'.

No. 2a. pr. 1 m²	Number	Rough weight
Abra alba	35,5	4,636
Macoma calcarea	34,5	31,000
Saxicava rugosa	1,8	6,182
Astarte Banksii	24,5	8,545
» borealis	5,5	25,000
» elliptica	17,3	33,182
Cardium fasciatum	10,9	1,000
Modiolaria discors	8,2	2,273
» nigra	0,9	0,009
Modiola modiolus	50,9	1636,364
Buccinum undatum	9,1	21,455
Trochus cinerareus	0,9	0,009
Chiton sp.	23,6	1,273
Lepidonotus squamatus	57,3	27,727
Nephthys sp.	22,7	9,545
Trophonia plumosa	58,2	29,545
Pectinaria Koreni	4,5	0,545
Terebellidæ	Fragm.	7,200
Sabellidæ	»	0,800
Ophiopholis aculeata	244,5	181,818
Ophioglypha albida	3,6	0,273
» robusta	118,2	4,727
Cribrella sanguinolenta	1,8	0,545
Asterias rubens	0,9	327,273
Echinocyamus pusillus	2,7	0,091
Str. drøbakiensis	8,2	54,091
Phyllophorus pellucidus	15,5	136,364
Psolus phantaphus	4,5	2,091
Gammaridæ	11,8	0,364
Balanidæ	∞	954,545
Porifera	∞	19,091
Hydroidæ	∞	3,727
Ascidiæ	∞	272,727
		3804,017
		(249,845)

In the neighbourhood of Knudshoved.
The bottom consists of small stones with detritus.
Sand also occurring in this.
11 samples à 0,1 m². — Depth 20—25 meters.
1911, April 7'.

No. 2b. pr. 1 m²	Number	Rough weight
Macoma calcarea	2,7	2,667
Astarte Banksii juv.	12,7	6,133
» borealis juv.	5,3	
» elliptica juv.	10,0	
» borealis	6,0	38,667
Cardium fasciatum	15,3	2,000
Modiolaria nigra	8,0	3,200
Modiola modiolus	2,0	12,000
Buccinum undatum	1,3	1,733
Chiton sp.	2,0	0,067
Lepidonotus squamatus	Fragm.	2,417
Enipo Kinbergi	0,7	0,067
Phyllodoce maculata	0,7	0,133
Nephthys sp.	Fragm.	6,717
Travisia Forbesi	2,0	0,333
Terebellidæ	16,7	1,680
Sabellidæ	Fragm.	0,187
Nemertini	0,7	0,200
Ophiopholis aculeata	14,7	9,600
Ophioglypha albida	49,3	2,467
» robusta		
Asterias rubens	0,7	17,333
Str. drøbakiensis	2,0	14,667
Phyllophorus pellucidus	10,0	18,333
Psolus phantapus	1,3	0,667
Gammaridæ	4,0	0,067
Mysidæ	0,7	0,007
		141,342
		(10,24)

E. of Knudshoved.
Gravel and small stones with coarse detritus.
15 samples à 0,1 m². — Depth 22—25 meters.
1911, May 23'.

No. 2c. pr. 1 m²	Number	Rough weight
Abra alba	27,9	3,000
Macoma calcarea	16,4	14,143
Astarte Banksii » borealis < 32 mm	19,3	28,786
» elliptica < 35 mm.	12,1	22,214
Cardium fasciatum	9,3	0,929
Modiolaria discors	7,1	1,286
» nigra	4,3	6,000
Modiola modiolus	30,7	482,143
Neptunea antiqua	0,7	11,214
Buccinum undatum	1,4	3,071
Chiton sp.	16,4	0,929
Lepidonotus squamatus	50,0	20,357
Nephthys sp.	Fragm.	7,939
Travisia Forbesi	0,7	0,418
Pectinaria Koreni	0,7	0,214
Terebellidæ	35,7	6,643
Ophiopholis aculeata	142,9	78,714
Ophioglypha albida	22,1	2,143
» robusta	14,3	0,071
Solaster papposus	1,4	0,429
Cribrella sanguinolenta	1,4	0,643
Str. drøbakiensis	7,1	64,286
Phyllophorus pellucidus	26,4	135,714
Psolus phantapus	7,1	3,714
Gammaridæ	1,4	0,071
Balanidæ	∞	346,429
Ascidiæ	∞	108,143
		1349,643 (91,957)

E. of Knudshoved.
Bottom exclusively smaller and larger stones with detritus.
14 samples à 0,1 m².
1911, May 24'.

No. 22. pr. 1 m²	Number	Rough weight
Abra alba	3	0,20
Macoma calcarea	41	95,80
» » juv.	16	0,70
Saxicava rugosa	2	3,00
Mya sp.	2	0,10
Astarte Banksii	134	20,20
» elliptica	6	1,20
Cyprina islandica	1	21,50
» » juv.	3	0,10
Cardium fasciatum	8	0,50
Leda pernula	5	0,70
» minuta	10	0,70
Nucula tenuis	4	0,20
Modiolaria nigra	10	3,60
Modiola modiolus	2	24,50
Trophon truncatus	2	0,20
Lepidonotus squamatus	3	0,30
Enipo Kinbergi	2	1,10
Lanice conchylega	3	3,00
Lumbrinereis fragilis	2	2,00
Aricia armiger	Fragm.	1,20
Nephthys sp.	»	17,60
Trophonia plumosa	2	2,00
Maldanidæ	Fragm.	0,20
Pectinaria Koreni	6	1,00
Terebellidæ	11	5,60
Nemertini	2	0,20
Ophiopholis aculeata	15	3,50
Ophioglypha albida	∞	10,10
» robusta	+	1,40
Echinocardium cordatum juv.	95	15,20
Echinocyamus pusillus	2	0,20
Phyllophorus pellucidus	3	6,30
Psolus phantapus	4	1,70
Gammaridæ	25	1,20
Diastylis sp.	13	0,70
Actiniidæ	12	0,60
Ascidiæ	∞	15,70
		264,00 (23,68)

Deep channel, 2 miles W. of Egholm.
Clay, gravel and small stones; many dead shells of Cyprina.
10 samples à 0,1 m². — Depth 33—42 meters.
1912, April 27'.

No. 24. pr. 1 m²	Number	Rough weight
Abra alba	4	0,40
Macoma calcarea	9	2,20
Mya truncata	1	2,50
Astarte Banksii	3	1,30
» borealis	1	3,50
» elliptica	4	11,30
Cyprina islandica juv.	1	0,10
Cardium fasciatum	1	0,10
Leda minuta	3	0,40
Modiolaria nigra	2	0,30
Modiola modiolus	5	18,00
Buccinum undatum	5	20,50
Trophon truncatus	1	0,10
Chiton sp.	3	0,40
Lepidonotus squamatus	10	5,70
Enipo Kinbergi	1	0,20
Phyllodoce maculata	1	0,30
Lumbrinereis fragilis	Fragm.	1,30
Goniada maculata	1	0,10
Nephthys sp.	Fragm.	4,50
Trophonia plumosa	5	2,00
Maldanidæ	Fragm.	0,40
Ampharetidæ	1	0,10
Terebellides Strømi	Fragm.	5,00
Planaria	1	0,40
Ophiopholis aculeata	∞	47,00
Ophioglypha albida	∞	2,00
» robusta	∞	9,70
Cribrella sanguinolenta	1	8,50
Asterias rubens	1	1,50
Echinocardium cordatum juv.	3	0,20
Str. drøbakiensis	2	10,50
Phyllophorus pellucidus	2	7,00
Gammaridæ	16	0,50
Diastylis sp.	6	0,40
Balanus sp.	1	5,50
Ascidiæ	∞	9,00
Actiniidæ	1	0,20
Hydroidæ	∞	3,00
		186,10 (15,11)

Deep, narrow channel E. of Sprogø.
Clay and sand with small stones.
10 samples à 0,1 m². — Depth 27—42 meters.
1912, April 29'.

Great Belt. N. of Sprogø. a. b. c. Stations frequently with E.

No. 9. pr. 1 m²	Number	Rough weight
Astarte Banksii	0,4	0,06
Cyprina islandica	0,4	32,60
Modiolaria nigra	0,2	0,14
Lepidonotus squamatus	0,2	0,04
Lumbrinereis fragilis	Fragm.	0,12
Nephthys sp.	11,0	3,80
Maldanidæ	Fragm.	0,24
Pectinaria Koreni	0,4	0,14
Terebellidæ	1,4	0,54
Nemertini	Fragm.	0,18
Ophioglypha albida	9,6	1,52
Echinocardium cordatum	6,4	63,62
Gammaridæ	2,8	0,22
Diastylis sp.	0,4	0,02
Eupagurus Bernhardus	0,2	3,02
Ascidiæ	0,2	0,02
		106,28 (5,328)

Off Skagbohuse.
The bottom consists of clay, sand and detritus, a few small stones.
50 samples à 0,1 m². — Depth 23 meters.
1911, April 11'.

No. 11. pr. 1 m²	Number	Rough weight
Abra alba 5,5-17 mm	38,0	7,20
» nitida	1,6	
Macoma calcarea 6-21 mm	32,4	8,50
Mya sp.	0,2	0,02
Corbula gibba	2,2	0,12
Solen pellucidus	0,4	0,10
Astarte Banksii 3,5-12 mm	78,4	50,82
» borealis 3,5-35 mm	16,0	
» elliptica 6-11 mm.	1,6	0,64
Cyprina islandica juv.	0,8	0,12
Cardium fasciatum	3,6	0,14
Montacuta bidentata	0,2	0,04
Leda pernula	7,6	1,70
» minuta	0,2	
Nucula tenuis	7,2	0.52
Modiolaria nigra	0,2	0,04
Phyllodoce maculata	0,2	0,04
Lumbrinereis fragilis	Fragm.	0,32
Nephthys sp.	»	10,78
Maldanidæ	»	0,26
Pectinaria Koreni	1,8	0,70
Terebellides Strømi	Fragm.	1,00
Artacama proboscidea	»	
Priapulus caudatus	0,4	0,88
Nemertini	0,4	0,10
Ophioglypha albida 12-60 mm	16,0	2,90
» texturata	0,4	0,80
Echinocardium cordatum < 36 mm	1,8	14,40
Gammaridæ	1,0	0,32
Diastylis sp.	5,0	
		102,46 (6,75)

Elefantgrunden.
Detritus and sand.
50 samples à 0,1 m². — Depth 16—18 meters.
1911, May 11'.

No. 13. pr. 1 m²	Number	Rough weight
Abra alba	2	0,10
Macoma calcarea	82	21,80
» baltica	1	0,20
Mya sp. juv.	7	1,50
Astarte Banksii	63	9,50
» borealis	9	71,10
» elliptica	9	4,80
Cyprina islandica	1	26,60
» » juv.	1	0,80
Cardium fasciatum	23	0,90
Nucula tenuis	1	0,10
Modiolaria nigra	4	1,20
Modiola modiolus	1	0,10
Buccinum undatum	1	0,10
Bela turricula	2	0,10
Acera bullata	2	0,20
Goniada maculata	1	0,95
Nephthys sp.	Fragm.	16,24
Travisia Forbesi	2	1,91
Maldanidæ	Fragm.	1,10
Terebellidæ	26	2,50
Ophioglypha albida	73	3,40
Asterias rubens	1	0,10
Echinocyamus pusillus	32	0,60
Echinus sp.	1	0,10
Diastylis sp.	4	0,05
Mysidæ	1	0,05
		166,10 (11,53)

5 miles N. E. of Romsø Light.
Light, clayey detritus with sand og small stones, brown upper layer.
10 samples à 0,1 m². — Depth 18 meters.
Temp. 10,8° C.
1911, August 4'.

No. 15. pr. 1 m²	Number	Rough weight
Abra alba	20,5	4,10
Macoma calcarea	28,5	21,45
Mya sp.	0,5	0,01
Corbula gibba	1,0	0,01
Solen pellucidus	1,0	0,85
Astarte Banksii	17,5	3,45
» borealis	3,5	
Cyprina islandica juv.	2,0	0,15
Cardium fasciatum	0,5	0,01
Nucula tenuis	1,5	0,10
Modiolaria nigra	0,5	1,00
» » juv.	3,0	0,10
Buccinum undatum	0,5	0,10
Aporrhais pes pelecani	0,5	1,10
Lepidonotus squamatus	Fragm.	1,85
Nephthys sp.	»	16,40
Maldanidæ	»	0,15
Pectinaria Koreni	0,5	0,15
Terebellidæ	4,0	1,40
Nemertini	Fragm.	0,10
Ophioglypha albida	25,0	2,85
« texturata	0,5	0,90
Echinocardium cordatum	0,5	1,20
Gammaridæ	3,0	0,10
Diastylis sp.	7,0	0,10
Mysidæ	0,5	0,05
		57,68 (6,885)

5,5 miles S. 1/2 E. of Romsø Light.
Light clay with very little sand and brown upper layer.
20 samples à 0,1 m². — Depth 21 meters.
Temp. 10,3° C.
1911, Avgust 4'.

No. 25. pr. 1 m²	Number	Rough weight
Abra alba	67,50	12,750
Macoma calcarea	11,25	3,750
Mya sp.	1,25	0,125
Astarte Banksii	55,00	10,250
» elliptica	1,25	0,250
Cardium fasciatum	1,25	0,125
Leda pernula	1,25	1,250
Nucula tenuis	1,25	0,125
Harmothoë sp.	1,25	0,125
Lumbrinereis fragilis	2,50	2,750
Nephthys sp.	Fragm.	30,000
Maldanidæ	»	0,750
Terebellides Strømi	3,75	0,375
Artacama proboscidea	10,00	4,875
Nemertini	1,25	0,125
Ophioglypha albida	23,75	3,000
» texturata	1,25	2,625
Echinocardium cordatum	1,25	9,000
» » juv.	78,75	13,500
Gammaridæ	5,00	0,375
Diastylis sp.	15,00	0,875
Hydroidæ	1,25	1,000
Virgularia mirabilis	1,25	0,125
		98,125 (11,24)

N. of Sprogø.
Soft, dark clay with a little sand, brown upper layer.
8 samples à 0,1 m². — Depth 21—23 meters.
1912, April 29'.

No. 26. pr. 1 m²	Number	Rough weight
Abra alba	82	24,40
» nitida	56	4,00
Macoma calcarea	20	8,70
Corbula gibba	8	0,60
Astarte Banksii	6	0,60
» elliptica	4	0,50
Cyprina islandica juv.	8	3,10
Cardium fasciatum	1	0,10
Axinus flexuosus	4	0,60
Leda pernula	17	3,20
Nucula tenuis	41	2,20
Aphrodite aculeata	1	0,50
Nephthys sp.	Fragm.	16,00
Maldanidæ	»	0,50
Terebellides Strømi	4	1,00
Nemertini	Fragm.	1,00
Planaria	1	0,10
Ophioglypha albida	56	5,20
» texturata	3	2,00
Echinocardium cordatum	17	148,00
» » juv.	270	45,40
Gammaridæ	6	0,50
Diastylis sp.	8	0,50
Virgularia mirabilis	3	0,10
		268,80 (14,06)

Deep channel E. of Elefantgrunden.
The bottom soft, dark, clayey and with light upper layer.
10 samples à 0,1 m². — Depth 22—28 meters.
1912, April 29'.

Great Belt. S. of Sprogø. a. b. c. Stations, as a rule without E.

No. 4a. pr. 1 m²	Number	Rough weight
Abra alba	1,2	0,14
Macoma calcarea	15,2	16,50
Cyprina islandica	0,4	17,80
Leda pernula juv.	0,6	0,04
Neptunea antiqua	0,4	11,36
Buccinum undatum	0,2	0,46
Aphrodite aculeata	0,2	0,30
Phyllodoce maculata	Fragm.	0,30
Nephthys sp.	»	5,66
Trophonia sp.	0,2	0,08
Pectinaria Koreni	1,0	0,58
Planaria	0,6	0,16
Ophioglypha albida	18,0	2,10
Echinocardium cordatum	0,6	5,18
Str. drøbakiensis	0,2	0,24
Crangon vulgaris	0,2	0,06
		60,96 (5,48)

Deep channel W. S. W. of Korsør.
The bottom consists of detritus with gravel and small stones.
50 samples à 0,1 m². — Depth 30—35 meters.
1911, April 8'.

No. 4b. pr. 1 m²	Number	Rough weight
Abra alba 3-15 mm	200,0	11,12
Macoma calcarea 4-32 mm	48,0	16,00
» baltica	0,4	0,02
Mya sp.	0,4	0,02
Cyprina islandica juv.	2,4	0,08
Cardium fasciatum	4,0	0,08
Leda pernula	31,6	1,92
» minuta	5,2	0,08
Nucula tenuis	50,4	2,44
Natica grønlandica juv. 4,5 mm	0,4	0,04
Nychia cirrosa	0,8	0,08
Phyllodoce maculata	3,2	0,64
Aricia armiger	Fragm.	0,08
Nephthys sp.	»	10,64
Trophonia	0,4	0,24
Maldanidæ	Fragm.	0,16
Pectinaria Koreni	10,4	1,32
Terebellidæ	2,4	0,60
Nemertini	Fragm.	0,56
Ophioglypha albida	152,0	8,32
Echinocardium cordatum juv. 3-8 mm	16,8	0,12
Echinocyamus pusillus	0,8	0,08
Gammaridæ	10,0	0,20
Diastylis sp.	110,0	1,64
Ascidiæ	1,2	0,08
		56,56 (5,848)

Deep channel W. S. W. of Korsør.
The bottom consists of detritus with gravel and small stones.
25 samples à 0,1 m². — Depth 30—35 meters.
Temp. 12,5° C.
1911, October 6'.

No. 6a. pr. 1 m²	Number	Rough weight
Macoma calcarea > 6 mm	19,2	15,72
Astarte Banksii < 10 mm	29,0	6,48
» borealis < 22 mm	18,4	17,40
» elliptica < 11 mm	0,6	0,08
Cyprina islandica < 70 mm	1,0	74,10
Modiolaria nigra	0,2	0,02
Buccinum undatum	0,2	2,62
Lepidonotus squamatus	0,6	0,06
Phyllodoce maculata	0,2	
Goniada maculata	0,2	2,08
Nephthys sp.	Fragm.	0,16
Trophonia plumosa	0,4	0,04
Maldanidæ	Fragm.	0,90
Terebellidæ	3,6	0,02
Nemertini	0,2	
Ophioglypha albida 25-70 mm	17,2	3,88
Asterias rubens	0,2	0,12
Echinus miliaris	0,4	0,72
Gammaridæ	0,6	0,02
Diastylis sp.	1,2	0,04
Ascidiæ	4,2	0,98
		125,44 (7,588)

E. of Vresen's buoy.
The bottom consists of detritus and sand.
50 samples à 0,1 m². — Depth 23 meters.
1911, April 10'.

No. 6b. pr. 1 m²	Number	Rough weight
Abra alba	22,6	0,64
Macoma calcarea	43,6	16,40
Mya sp.	0,2	0,01
Astarte Banksii 3-10 mm	324,0	64,20
» borealis 4-30 mm	62,8	90,00
» elliptica 4-25 mm	19,0	8,64
Cyprina islandica	2,2	88,00
» » juv.	0,6	2,12
Cardium fasciatum	0,6	0,01
Leda pernula juv. / » minuta juv.	2,6	0,06
Crenella decussata	1,0	0,002
Nucula tenuis	0,6	0,01
Modiolaria nigra	1,2	0,86
Natica islandica	0,2	0,02
Bela turricula	0,8	0,04
Lepidonotus squamatus	1,0	0,22
Enipo Kinbergi	Fragm.	
Phyllodoce maculata	0,6	
Goniada maculata	0,8	0,42
Aricia armiger	0,4	
Brada villosa	0,2	
Nephthys sp.	Fragm.	8,28
Trophonia plumosa	1,0	0,12
Maldanidæ	Fragm.	2,58
Terebellidæ	»	
Gephyrea	0,4	0,04
Nemertini	Fragm.	0,38
Planaria	0,2	0,02
Ophioglypha albida	30,0	5,28
Asterias rubens	0,8	5,50
Echinocardium cordatum juv. 4-10 mm	14,8	0,30
Echinocyamus pusillus	1,0	0,01
Phyllophorus pellucidus	0,2	0,54
Gammaridæ	5,4	0,12
Diastylis sp.	31,6	0,44
Gastrosaccus spinifer / Mysidæ	7,8	0,08
Ascidiæ juv.	50,0	12,02
		307,362 (16,67)

E. of Vresens buoy.
The bottom consists of detritus and sand.
50 samples à 0,1 m². — Depth 23 meters.
1911, October 7'.

No. 6c. pr. 1 m²	Number	Rough weight
Abra alba	0,4	0,04
Macoma calcarea	22,4	19,08
Mya sp.	0,8	0,12
Astarte Banksii(+borealis?)	210,4	37,48
» borealis	8,8	20,88
» elliptica	8,0	3,20
Cyprina islandica	2,8	128,00
» » juv.	0,4	0,04
Cardium fasciatum	1,2	0,16
Modiolaria nigra	3,6	1,24
Buccinum undatum	0,4	0,04
Trophon truncatus	0,8	0,04
Lepidonotus squamatus	3,6	0,40
Nephthys sp.	Fragm.	8,68
Trophonia plumosa	2,4	1,00
Pectinaria Koreni	1,6	0,20
Maldanidæ	Fragm.	2,60
Terebellidæ	»	
Ophioglypha albida	98,8	10,92
Asterias rubens	0,8	0,68
Echiocyamus pusillus	1,6	0,08
Gammaridæ	10,4	0,40
Diastylis sp.	12,8	0,36
Gastrosaccus spinifer	3,2	0,16
Crangon vulgaris	0,4	0,20
Ascidiæ	∞	35,92
Porifera	∞	11,32
		283,24 (18,56)

E. of Vresens buoy.
The bottom is dark clay mixed with sand and gravel with small stones. Sifting easy.
25 samples à 0,1 m². — Depth 23 meters.
1912, April 15'.

No. 6d. pr. 1 m²	Number	Rough weight
Macoma calcarea	22	12,70
Solen pellucidus	1	0,20
Astarte Banksii(+borealis?)	504	86,50
» borealis	63	100,30
» elliptica	6	0,70
Cyprina islandica	4	220,00
Cardium fasciatum	3	0,10
Modiolaria nigra	3	0,30
Lepidonotus squamatus	1	0,20
Aricia armiger	Fragm.	0,10
Nephthys sp.	ca. 30	12,00
Trophonia plumosa	1	0,20
Maldanidæ	Fragm.	0,40
Terebellides Strømi	11	1,20
Amphitrite cirrata	1	0,40
Nemertini	1	0,80
Ophioglypha albida	46	8,70
» » juv.	18	0,50
Asterias rubens	1	6,80
Gammaridæ	5	0,20
Diastylis sp.	44	1,00
Gastrosaccus spinifer	2	0,10
Ascidiæ	∞	17,30
		470,70 (25,43)

E. of Vresens buoy.
The bottom dark, granulous, very sandy, with brown upper layer and small stones.
10 samples à 0,1 m². — Depth 22 meters.
1912, September 11'.

No. 6e. pr. 1 m²	Number	Rough weight
Abra alba	8	0,30
Macoma calcarea	18	7,00
Mya sp.	1	0,20
Corbula gibba	1	0,10
Astarte Banksii	830	138,80
» borealis	56	72,10
» elliptica	15	6,00
» Banksii & borealis juv.	250	8,60
Cyprina islandica	5	198,00
» » juv.	9	0,10
Cardium fasciatum	1	0,10
Leda minuta	4	0,20
Nucula tenuis	1	0,10
Modiolaria nigra	9	1,50
Modiola modiolus	1	18,50
Buccinum undatum	1	6,40
Harmothoë sp.	1	0,10
Lanice conchylega	1	0,20
Aricia armiger	2	0,10
Nephthys sp.	Fragm.	6,40
Trophonia plumosa	2	1,40
Maldanidæ	Fragm.	0,50
Pectinaria Koreni	1	0,70
Amphitrite cirrata	3	0,80
Terebellides Strømi	9	0,50
Sabellidæ	2	0,20
Ophioglypha albida	85	5,80
» texturata	1	1,00
Phyllophorus pellucidus	2	0,20
Echinocyamus pusillus	5	0,10
Gammaridæ	1	0,10
Diastylis sp.	41	0,60
Ascidiæ	∞	8,60
		485,30 (24,79)

E. of Vresen.

Sand and ooze. Many Astarte, newly dead; but gradually these shells are dissolved.

10 samples à 0,1 m². — Depth 22 meters.

1912, October 12'.

No. 8a. pr. 1 m²	Number	Rough weight
Abra alba	12,4	3,82
Solen pellucidus	0,2	0,02
Astarte elliptica	0,2	0,86
Leda pernula	0,2	0,02
Nucula tenuis	0,6	0,06
Phyllodoce maculata	0,2	0,08
Nephthys sp.	16,0	3,62
Artacama proboscidea	2,6	1,12
Nemertini	0,2	0,02
Ophioglypha albida	23,2	4,44
Gammaridæ	0,8	0,06
Diastylis sp.	1,0	0,04
		14,16 (1,486)

Off Kløverhage.

The bottom consists of stinking detritus with a little dead Zostera.

50 samples à 0,1 m². — Depth 21 meters.

1911, April 11'.

No. 8b. pr. 1 m²	Number	Rough weight
Abra alba 3-20 mm	120,0	9,16
Macoma calcarea	1,4	0,62
Corbula gibba	0,6	0,02
Solen pellucidus	0,2	0,04
Astarte Banksii	5,6	0,66
» borealis	0,2	
Cyprina islandica	0,2	18,14
» » juv.	1,4	0,64
Leda pernula	2,8	0,12
Nucula tenuis	1,2	0,12
Nephthys sp.	Fragm.	6,30
Maldanidæ	»	0,02
Pectinaria Koreni	2,4	0,16
Terebellidæ	1,2	0,26
Ophioglypha albida 15-50 mm	40,0	5,76
Echinocardium cordatum juv. > 4,5 mm	6,6	0,46
Gammaridæ	2,0	0,06
Diastylis sp.	31,0	0,40
Mysidæ	1,0	0,02
		42,96 (3,47)

Off Kløverhage.

Stinking detritus with sand and a little dead Zostera.

50 samples à 0,1 m². — Depth 21 meters. Temp. 13,3° C.

1911, October 3'.

Great Belt. Poor a. b. c. Stations without E. and without full-grown Cryprina. Shallower water.

No. 21. pr. 1 m²	Number	Rough weight
Abra alba	2	0,20
Macoma calcarea	11	8,80
Astarte Banksii	7	0,70
» elliptica	1	0,10
Cardium fasciatum	4	0,20
Buccinum undatum	1	3,00
Natica grønlandica	1	1,00
Trophon truncatus	1	0,10
Chiton sp.	1	0,10
Lepidonotus squamatus	3	0,50
Aricia armiger	Fragm.	0,10
Nephthys sp.	»	12,90
Spionidæ	1	0,10
Trophonia	3	1,00
Maldanidæ	Fragm.	0,20
Artacama proboscidea	2	1,00
Nemertini	2	0,40
Ophioglypha albida	44	4,00
Phyllophorus pellucidus	2	2,20
Psolus phantapus	1	0,10
Diastylis sp.	8	0,30
Balanidæ	1	2,20
Ascidiæ	∞	40,40
		79,60
		(8,87)

Deep channel E. of Langeland.
Dark clay and gravel with small stones.
10 samples à 0,1 m². — Depth 28—33 meters.
1912, April 24'.

No. 5. pr. 1 m²	Number	Rough weight
Abra alba	21,2	8,72
Macoma calcarea	3,4	2,70
Nephthys sp.	22,8	6,90
Maldanidæ	0,8	0,04
Nemertini	0,2	0,12
Ophioglypha albida	63,0	8,24
Asterias rubens	0,2	0,08
		26,80
		(2,686)

S. E. of Sprogø.
The bottom consists of pure detritus without sand.
50 samples à 0,1 m². — Depth 21 meters.
1911, April 10'.

No. 7. pr. 1 m²	Number	Rough weight
Macoma calcarea	14,6	0,74
Cardium edule	0,2	0,02
Corbula gibba	0,2	0,02
Aricia armiger	Fragm.	0,04
Nephthys sp.	»	0,72
Maldanidæ	0,8	0,02
Pectinaria Koreni	0,8	0,20
Ophioglypha albida	0,8	0,30
Asterias rubens	0,2	0,34
Gastrosaccus spinifer	0,6	0.02
		2,42
		(0,296)

1,5 miles E. of Vresen.
The bottom consists of fine sand without vegetation.
50 samples à 0,1 m². — Depth 14 meters.
1911, April 10'.

No. 17. pr. 1 m²	Number	Rough weight
Abra alba	2,0	0,15
Macoma calcarea	6,0	4,35
» baltica	1,5	0,20
Solen pellucidus	2,5	0,20
Buccinum undatum	0,5	4,35
Nassa reticulata	1,5	1,00
Acera bullata	0,5	0,05
Nephthys sp.	Fragm.	5,65
Arenicola marina	»	2,65
Pectinaria Koreni	9,0	1,90
Nemertini	Fragm.	0,10
Ophioglypha albida	16,5	2,50
Asterias rubens	0,5	1,55
Diastylis sp.	0,5	0,05
		24,70
		(3,19)

S. W. of Slipshavn, Nyborg Fjord.
Black, very soft, granulous and sand-mixed mud; uppermost a layer of black, dead Zostera, which makes the sifting difficult.
20 samples à 0,1 m². — Depth 12—13 meters.
1912, April 17'.

No. 18. pr. 1 m²	Number	Rough weight
Abra alba	10,0	1,35
Macoma calcarea	1,5	1,90
Corbula gibba	1,5	0,05
Solen pellucidus	0,5	0,05
Nereis sp.	0,5	0,05
Nephthys sp.	Fragm.	6,55
Arenicola marina	0,5	1,30
Pectinaria Koreni	2,0	0,45
Ophioglypha albida	31,0	7,95
Asterias rubens	0,5	0,40
Diastylis sp.	2,0	0,10
		20,15
		(2,26)

S. of Knudshoved, Nyborg Fjord.
Dark, soft mud mixed with sand and clay, with a thinner layer of decaying Zostera, which however makes the sifting difficult.
20 samples à 0,1 m². — Depth 16 meters.
1912, April 17'.

No. 27. pr. 1 m²	Number	Rough weight
Abra alba	1,36	
Macoma calcarea	4,55	
» baltica	2,73	
Corbula gibba	6,82	
Solen pellucidus	2,73	
Littorina littorea	0,45	
		3,182
Aricia armiger	1,36	
Nephthys sp.	2,73	
Pectinaria Koreni	13.64	
Asterias rubens	0,45	
Carcinus mænas	0,45	5,091
Crangon vulgaris	0,45	0,091
		8,364
		(0,78)

From Musholmen to Lysegrundene.
The bottom mostly was white sand, at some places with a little mud within it; at other places were stones with red Algae and Laminarians. Throughoutly very poor. Zostera at the shallowest water.
(St. No. 27 is on the chart at 3 places.)
22 samples à 0,1 m. — Depth 8—16 meters.
1912, April 30'.

Great Belt. d. Stations. Nyborg Fjord.

No. 28. pr. 1 m²	Number	Rough weight
Abra alba	292	33,0
Macoma calcarea	74	17,0
» baltica	84	15,0
Solen pellucidus	10	0,6
Cyprina islandica juv.	2	0,4
Nassa reticulata	2	0,6
Philine sp.	2	0,4
Nephthys sp.	Fragm.	14,2
Pectinaria Koreni	22	5,6
Terebellides Strømi	8	0,4
Planaria	2	0,4
Ophioglypha albida	16	0,6
Asterias rubens	2	5,4
Diastylis sp.	4	0,2
		93,8 (9,57)

Jammerland Bay — the channel inside Lysegrundene.
The bottom soft, dark and coherent (clayey) with much detritus.
(St. No. 28 in on the chart at 2 places.)
5 samples à 0,1 m². — Depth 13—14 meters.
1912, April 30'.

No. 1a. pr. 1 m²	Number	Rough weight
Macoma baltica 5-13 mm	20,4	3,50
Mya sp.	0,2	0,01
Cardium fasciatum » exiguum	10,0	0,33
Modiolaria discors	0,8	0,02
Mytilus edulis	0,8	7,70
Nassa reticulata	6,6	1,24
Littorina littorea	1,8	0,58
» obtusata	0,2	0,01
Lacuna divaricata	0,8	0,04
» pallidula	0,2	0,01
Rissoa membranacea < 10 mm	22,4	0,61
Acera bullata	0,4	0,02
Doris sp.	0,2	0,02
Nereis sp.	0,4	0,24
Nephthys sp.	5,6	0,71
Pectinaria Koreni	0,2	0,02
Asterias rubens 6-20 mm	9,6	2,44
Gammaridæ	1,4	0,08
Idothea sp.	1,0	0,08
Carcinus mænas	0,2	0,05
		17,71 (0,972)

Hvidegrunden (Nyborg Fjord).
The bottom consists of coarse and fine sand, small stones. — Vegetation: Laminarians, Fucus, Zostera and Furcellaria.
50 samples à 0,1 m². — Depth 4—7 meters.
1911, April 6'.

No. 1b. pr. 1 m²	Number	Rough weight
Macoma baltica 3-15 mm	47,6	4,56
Cardium fasciatum » exiguum	12,0	0,40
Montacuta bidentata 3 mm	1,2	0,02
Modiolaria discors	6,4	0,10
Mytilus edulis	0,8	15,20
Nassa reticulata	4,4	1,96
Littorina littorea < 30 mm	2,0	3,00
Lacuna divaricata	10,0	0,44
Rissoa membranacea < 6 mm » inconspicua	33,2	0,36
Acera bullata	0,4	0,02
Harmothoë imbricata	Fragm.	0,16
Nereis sp.	»	0,32
Aricia armiger	»	0,64
Nephthys sp.	»	0,32
Terebellidæ	»	0,16
Gephyrea	0,4	0,04
Ophioglypha albida	1,2	0,04
Asterias rubens	4,0	0,48
Tipula-Larvæ	0,8	0,02
Gammaridæ	16,0	0,28
Idothea sp.	1,2	0,04
Mysidæ	2,0	0,08
Ascidiæ	2,0	0,08
		28,72 (1,44)

Hvidegrunden (Nyborg Fjord).
Sand with broad-leaved Zostera.
25 samples à 0,1 m². — Depth 5—8,5 meters.
1911, August 8'.

No. 1c. pr. 1 m²	Number	Rough weight
Macoma calcarea	17,0	3,60
Saxicava rugosa	1,0	0,80
Cardium fasciatum » exiguum	8,0	0,30
Montacuta bidentata	2,0	0,10
Mytilus edulis	1,0	30,00
Nassa reticulata	7,0	5,00
Cerithium reticulatum	319,0	4,20
Rissoa membranacea » inconspicua	816,0	8,90
Harmothoë imbricata	8,0	0,60
Aricia armiger	Fragm.	0,40
Nephthys sp.	»	2,00
Pectinaria Koreni	1,0	0,10
Terebellidæ	3,0	0,20
Asterias rubens	5,0	8,50
Actiniidæ	1,0	0,30
Ascidiæ	2,0	0,20
		65,20 (3,54)

Hvidegrunden (Nyborg Fjord).
Sand with broad leaved Zostera.
10 samples à 0,1 m². — Depth 4—8 meters.
1911, September 28'.

No. 16a. pr. 1 m²	Number	Rough weight
Macoma baltica	1	0,4
Mya arenaria	5	18,2
Scrobicularia plana	3	6,1
Mytilus edulis	1254	15500,0
Littorina littorea	179	135,5
Nereidæ	12	2,2
Arenicola marina	1	1,0
Asterias rubens	1	0,1
Gammaridæ	294	9,2
		15672,7 (247,18)

By Holckenhavns lock (Nyborg Fjord).
»Mytilus-bottom«, black, stinking mud.
10 samples à 0,1 m². — Depth 2 meters.
1911, September 27'.

No. 16b. pr. 1 m²	Number	Rough weight
Macoma baltica	30	7,00
Mya sp.	820	36,00
Cardium edule	80	8,00
Mytilus edulis	3580	18500,00
» » juv.	380	70,00
Littorina littorea	140	132,00
Nereis sp.	80	20,00
Gammaridæ	220	11,00
		18784,00 (438,86)

By Holckenhavns lock (Nyborg Fjord).
1 normal sample taken out of 10 samples à 0,1 m².
Depth 2 meters.
1912, September 13'.

No. 19. pr. 1 m²	Number	Rough weight
Macoma baltica	176	27,40
Scrobicularia plana	1	1,40
Modiolaria discors	13	0,30
Nassa reticulata	4	1,80
Cerithium reticulatum	12	0,20
Littorina littorea	3	1,40
Harmothoë sp.	Fragm.	0,30
Aricia armiger	»	1,90
Gephyrea	7	1,40
Asterias rubens	30	7,50
Tipula-Larvæ	18	0,10
Gammaridæ	16	0,70
Idothea sp.	8	0,50
		44,90
		(3,09)

The bay N. W. of Slipshavn.
Mud and broad-leaved Zostera.
10 samples à 0,1 m². — Depth 3 meters.
1912, April 18'.

No. 31. pr. 1 m²	Number	Rough weight
Macoma baltica	18	3,10
Mya arenaria	19	18,20
Cardium edule	3	4,80
Mytilus edulis	ca. 800	129,00
Nassa reticulata	7	3,60
Littorina littorea	647	175,00
Odostomia, Rissoa, Hydrobia	ca. 900	10,10
Arenicola marina	1	0,70
		344,50
		(14,67)

By Avernakke (Nyborg Fjord).
Short Zostera, coarse sand.
1 m² digged up. — Depth 1 meter.
1912, September 13'.

Great Belt. d. Stations. N. of Sprogø.

No. 12. pr. 1 m²	Number	Rough weight
Macoma baltica	77,0	2,000
Mytilus edulis	0,5	0,050
Lacuna pallidula	1,0	0,050
Aricia armiger	Fragm.	1,050
Nephthys sp.	»	
Gammaridæ	1,0	0,025
Diastylis sp.	1,5	0,025
Crangon vulgaris	Fragm.	0,050
		3,250
		(0,325)

3 miles S. W. of Lerckenborg.
Pure sand with green Zostera.
20 samples à 0,1 m². — Depth 10—13 meters.
Temp. 18,4° C.
1911, August 4'.

No. 14. pr. 1 m²	Number	Rough weight
Abra alba	9	0,20
Macoma calcarea	8	0,70
Mya sp.	2	0,20
Astarte elliptica	2	0,10
Cardium fasciatum	8	0,10
Mytilus edulis	1	9,30
Littorina littorea	2	5,40
Lacuna divaricata	15	0,20
Nephthys sp.	Fragm.	3,40
Pectinaria Koreni	3	0,20
Ophioglypha albida	17	0,20
Echinocyamus pusillus	1	0,05
Gammaridæ	4	0,05
		20,10
		(1,33)

1,5 miles E. N. E. of Bøgebjerg.
Pure sand with green Zostera in places.
10 samples à 0,1 m². — Depth 12—13 meters.
Temp. 16,3° C.
1911, August 4'.

No. 29a. pr. 1 m².	Number	Rough weight
Macoma baltica	7	0,20
Tellina tenuis	12	1,80
Cardium edule	31	117,50
Aricia armiger	Fragm.	0,60
Nephthys sp.	1	1,00
Idothea sp.	1	0,20
Carcinus mænas	1	20,60
		141,90
		(11,23)

N. of Stavreshoved.
Pure white sand (in places with Zostera).
(The samples are taken on the pure sand.)
The bottom-sampler digged ca. 5 cm into the bottom.
5 samples à 0,2 m². — Depth 3 meters.
1912, June 19'.

No. 29b. pr. 1 m²	Number	Rough weight
Macoma baltica	10	0,70
Tellina tenuis	46	1,20
Mya sp. juv.	5	0,20
Mactra subtruncata juv.	106	1,00
Cardium edule juv.	18	0,30
Rissoa membranacea	2	0,10
Aricia armiger	24	0,90
Nephthys sp.	8	2,70
Ophelia limacina	3	0,30
Arenicola marina	Fragm.	0,30
Asterias rubens	2	1,10
		8,80
		(1,15)

N. of Stavreshoved.
Sand.
5 samples à 0,2 m². — Depth 4 meters.
1912, August 27'.

Great Belt. d. Stations. S. of Sprogø.

No. 3a. pr. 1 m²	Number	Rough weight
Macoma baltica 6-12 mm.	20,6	3,20
Mya sp.	0,2	0,04
Cardium fasciatum 4-6 mm }	21,4	0,70
» exiguum }		
Modiolaria discors	0,6	0,02
Mytilus edulis	0,2	5,26
Littorina littorea	1,0	2,10
Rissoa membranacea 11mm	3,4	0,10
Lepidonotus squamatus	0,6	0,06
Nephthys sp.	1,2	0,08
Asterias rubens	4,4	0,52
Gammaridæ	3,8	0,14
		12,22
		(0,534)

E. of Vresen.
The bottom consists of fine and coarse sand with Zostera, Fucus, red Algae and Furcellaria.
50 samples à 0,1 m². — Depth 5—7 meters.
1912, April 8.

No. 3b. pr. 1 m²	Number	Rough weight
Macoma baltica	8,8	0,720
Cardium fasciatum }	6,0	0,200
» exiguum }		
Montacuta bidentata	1,2	0,012
Modiolaria discors	1,2	0,040
Mytilus edulis juv.	0,8	0,080
Nassa reticulata	0,4	0,480
Lacuna divaricata	8,0	0,320
Rissoa membranacea }	31,2	0,188
» inconspicua }		
Harmothoë imbricata	4,0 }	0,760
Nephthys sp.	Fragm. }	
Gephyrea	0,4	0,040
Asterias rubens	5,2	0,600
Gammaridæ	21,6	0,360
Idothea sp.	3,6	0,200
Mysidæ	5,2	0,080
Crangon vulgaris	0,4	0,320
Actiniidæ	0,4	0,280
		4,680
		(0,512)

E. of Vresen.
Sand and Zostera.
25 samples à 0,1 m². — Depth 5—6 meters.
1911, August 12'.

No. 10. pr. 1 m²	Number	Rough weight
Abra alba	8,4	2,40
Macoma baltica	76,0	23,64
Scrobicularia plana	0,4	2,60
Nassa reticulata	0,8	0,16
Lepidonotus squamatus	0,4	0,04
Nephthys sp.	13,6	1,64
Pectinaria Koreni	5,2	2,12
Ampharetidæ?	1,6	0,04
Nemertini	0,8	0,48
Ophioglypha albida	6,0	0,80
Asterias rubens	1,2	3,16
		37,08
		(2,56)

E. of Thurø (between Thurø and Langeland).
Light, loosely connected detritus.
25 samples à 0,1 m². — Depth 9—15 meters.
Temp. 12,4° C.
1911, May 22'.

No. 20. pr. 1 m²	Number	Rough weight
Macoma baltica	42	3,60
Mya sp.	3	0,20
Corbula gibba	1	0,10
Cardium edule	10	0,50
Hydrobia ulvæ	3	0,10
Aricia armiger	Fragm.	0,20
Nephthys sp.	»	1,50
Pectinaria Koreni	1	0,20
Terebellides Strømi	Fragm.	0,60
Ophioglypha albida	5	0,50
Asterias rubens	1	0,10
Gammaridæ	1	0,10
		7,70 (0,77)

E. of Langeland (between Omø Staalgrunde and the deep channel).
The bottom consists of fine sand and gravel.
10 samples à 0,1 m². — Depth 12—14 meters.
1912, April 24'.

No. 23. pr. 1 m²	Number	Rough weight
Macoma baltica	28	2,40
Mya sp.	9	0,50
Cardium edule	6	4,50
» » juv.	29	0,50
Mytilus edulis 70-90 mm	2	2000,00
» » juv. 3-30 mm	∞	
Littorina littorea	3	1,40
Nereis sp.	2	0,50
Aricia armiger	Fragm.	0,50
Nephthys sp.	1	0,30
Travisia Forbesi	5	0,10
Nemertini	3	0,20
Asterias rubens	9	13,50
Gammaridæ	8	0,20
Idothea sp.	9	0,20
		2024,80 (51,90)

W. of Omø and Omø Tofte.
Sand and gravel with scattered Mytilus in clusters.
10 samples à 0,1 m². — Depth 8—14 meters.
1912, April 27'.

No. 30. pr. 1 m²	Number	Rough weight
Macoma baltica juv.	25	0,70
Mya sp. juv.	23	1,50
Mactra subtruncata juv.	3	0,30
Cardium edule juv.	16	0,50
Hydrobia ulvæ	3	0,10
Rissoa membranacea	2	0,10
Nereis sp.	1	0,10
Aricia armiger	1	0,10
Nephthys sp.	3	0,70
Arenicola marina	ca. 10	3,20
Maldanidæ	1	0,10
Asterias rubens	2	1,10
Gastrosaccus spinifer	1	0,10
		8,60 (1,08)

W. of Vresen.
The bottom pure sand (in places between Zostera).
Some dead detritus was lying loosely upon the sand.
5 samples à 0,2 m². — Depth 4—5 meters.
1912, September 11'.

Little Belt. a. b. c. Stations, as a rule with Cyprina.

No. 1. pr. 1 m²	Number	Rough weight
Abra alba	16,4	1,08
Macoma calcarea	4,8	1,00
Astarte Banksii » borealis » elliptica	37,2	14,76
Cyprina islandica	2,0	94,40
» » juv.	1,2	0,12
Cardium fasciatum	2,4	0,16
Modiolaria nigra	0,8	0,12
Neptunea antiqua	0,4	0,08
Nephthys sp.	Fragm.	2,88
Trophonia sp.	1,2	0,32
Pectinaria Koreni	2,8	0,12
Terebellides Strømi	Fragm.	0,80
Sabellidæ	»	0,36
Ophioglypha albida	∞	5,32
		121,52 (7,032)

W. of Søby.
Gray, sandy, coherent bottom-layer.
Calcareous shells dissolved.
25 samples à 0,1 m². — Depth 26—28 meters.
1911, May 17'.

No. 2. pr. 1 m²	Number	Rough weight
Abra alba	46,8	7,800
Macoma calcarea	2,0	0,040
Corbula gibba	0,4	0,004
Cyprina islandica	1,6	31,600
» » juv.	6,0	0,240
Nephthys sp.	Fragm.	0,480
Pectinaria Koreni	0,8	0,004
Sabellidæ	Fragm.	0,020
Ophioglypha albida	1,2	0,120
Diastylis sp.	0,4	0,004
		40,312 (2,50)

W. of Søby.
Very thin, brown layer. Besides a quivering, loosely connected and very dark layer, with small stones and remains of Zostera. — Calcereous shells dissolved, except Epidermis; Abra-shells very thin.
25 samples à 0,1 m². — Depth 34 meters.
Temp. 4,3° C.
1911, May 17'.

No. 4. pr. 1 m²	Number	Rough weight
Abra alba	8,4	1,76
Solen pellucidus	2,0	0,68
Nassa reticulata	0,4	0,20
Harmothoë sp.	0,4	0,12
Nephthys sp.	Fragm.	1,16
Arenicola marina	1,6	4,40
Terebellides Strømi	Fragm.	0,08
Ophioglypha albida	16,4	2,32
Asterias rubens	0,4	0,04
		10,76 (1,46)

N. of Brandsø. W. of Aalehoved.
The bottom very soft, very dark, evil-smelling, loose, with many remains of Zostera.
25 samples à 0,1 m². — Depth 14—17,5 meters.
Temp. 10,0° C.
1911, May 18'.

No. 5. pr. 1 m²	Number	Rough weight
Abra alba	124,0	16,280
Macoma calcarea	14,4	1,360
Corbula gibba	7,2	0,320
Solen pellucidus	1,2	0,560
Cyprina islandica	7,2	196,000
» » juv.	2,0	0,640
Buccinum undatum	1,2	0,240
Harmothoë sp.	0,4	0,160
Nephthys sp.	Fragm.	3,200
Pectinaria Koreni	2,0	0,120
Terebellides Strømi	2,0	0,080
Sabellidæ	Fragm.	0,028
Priapulus caudatus	0,4	4,000
Ophioglypha albida	25,6	0,760
Asterias rubens	0,4	0,120
Diastylis sp.	0,8	0,040
Ascidiæ	0,4	0,160
		224,068
		(13,92)

5 miles N. E. of Nordborg castle.
Dark, soft, stinking bottom, with many remains of Zostera.
25 samples à 0,1 m². — Depth 22 meters.
Temp. 4,8° C.
1911, May 18'.

No. 9. pr. 1 m²	Number	Rough weight
Abra alba	4,17	0,250
Macoma calcarea	0,83	0,333
Corbula gibba	0,83	0,083
Thracia papyracea	10,00	0,500
Solen pellucidus	0,83	0,083
Astarte borealis	10,00	71,000
» elliptica	4,17	5,833
Cyprina islandica	2,50	119,167
Cardium fasciatum	3,33	0,500
Modiolaria discors	923,33	135,250
Buccinum undatum	13,33	143,333
Philine sp.	0,83	0,333
Lepidonotus squamatus	0,83	0,250
Harmothoë sp.	1,67	0,250
Nereis sp.	0,83	1,667
Nephthys sp.	Fragm.	2,167
Ophelia limacina	0,83	0,083
Pectinaria Koreni	6,67	1,333
Terebellides Strømi	0,83	0,083
Ophioglypha albida	50,00	9,167
Asterias rubens	6,67	31,667
Echinus miliaris	3 33	4,333
Phyllophorus pellucidus	5,83	11,250
Gammaridæ	0,83	0,083
Mysidæ	0,83	0,083
Carcinus mænas	2,50	4,417
Paguridæ	0,83	0,667
Ascidiæ	∞	37,500
		581,665
		(43,05)

The hard bottom round Fænø.
Larger and smaller stones, among which soft clay-bottom.
(St. No. 9 is on the chart at 3 places.)
12 samples à 0,1 m². — Depth 15—42 meters.
1912, May 4'.

No. 6a. pr. 1 m²	Number	Rough weight
Macoma baltica	34,8	8,06
Scrobicularia plana	2,6	5,06
Acera bullata	0,2	0,02
Nephthys sp.	Fragm.	0,56
Arenicola marina	1,6	11,30
Pectinaria Koreni	2,4	0,60
		25,60
		(3,054)

From Avernakø to the Lehnskov point.
Quivering, dark mud, filled with excrements, with a little dead Zostera. Stinking.
(St. No. 6 is on the chart at 3 places.)
50 samples à 0,1 m². — Depth 13—18 meters.
Temp. 7,2° C.
1911, May 20'—22'.

No. 6b. pr. 1 m²	Number	Rough weight
Macoma baltica	55,0	13,000
Scrobicularia plana	6,3	0,250
Lepidonotus squamatus ..	1,3	0,625
Nephthys sp.	Fragm.	0,750
Arenicola marina	5,0	10,625
Pectinaria Koreni	3,8	0,375
Gammaridæ	2,5	0,250
		25,875 (3,0625)

From Avernakø to the Lehnskov point.
(St. No. 6 is on the chart at 3 plaees.)
8 samples a 0,1 m². — Depth 12—20 meters.
Temp. 14,0° C.
1911, September 13'.

No. 7. pr. 1 m²	Number	Rough weight
Macoma calcarea	1	0,40
» baltica	3	
Nephthys sp	2	0,30
Pectinaria Koreni	6	0,80
Nemertini.....	1	0,30
Diastylis sp.	1	0,01
		1,81 (0,25)

N. E. of Skjoldnæs Light.
Black, stinking bottom with thin brown layer.
10 samples à 0,1 m². — Depth 29 meters.
1911, May 20'.

No. 8a. pr. 1 m²	Number	Rough weight
Macoma baltica < 15 mm	146	30,10
» » juv. > 3 mm	260	12,55
Scrobicularia plana	20	3,60
» » juv. ..	60	3,00
Cardium edule / » exiguum	10	1,50
Mytilus edulis	5	102,50
» » juv. > 3 mm	125	1,00
Cerithium reticulatum < 11 mm.....	1475	31,00
Littorina littorea	11	17,00
Lacuna divaricata	5	1,00
Rissoa membranacea < 5 mm.....	1350	7,50
» inconspicua	15	0,05
Harmothoë sp.....	4	0,75
Nereis sp	4	0,55
Aricia armiger	Fragm.	0,50
Arenicola marina.....	3	1,10
Gephyrea	3	0,30
Asterias rubens	4	2,80
Actiniidæ	1	0,90
		217,70 (10,06)

Svendborg Sund, by the ferry-pier, off the bathing houses.
Broad-leaved Zostera on soft, black, fresh bottom.
Rapid current.
10 samples à 0,1 m². — Depth 2 meters
1911, September 14'.

No. 8b. pr. 1 m²	Number	Rough weight
Macoma baltica	111	14,50
Scrobicularia plana	8	12,20
Modiolaria discors	20	1,00
Mytilus edulis	14	260,00
Cerithium reticulatum	3	0,10
Littorina littorea	29	59,40
» obtusata	55	1,10
Rissoa membranacea	ca. 700	5,80
Nereis sp.	10	3,00
Arenicola marina	12	9,20
Terebellidæ	3	0,20
Asterias rubens	7	6,40
Tipula-Larvæ	12	0,10
Idothea sp.	2	0,20
Ascidiæ	12	1,20
		374,40
		(14,13)

Svendborg Sund by the ferry-pier.
Black, soft bottom with broad-leaved Zostera.
(Current-locality.)
10 samples à 0,1 m². — Depth 2 Meters.
1912, April 19'.

No. 10. pr. 1 m²	Number	Rough weight
Macoma baltica	33	11,00
Scrobicularia plana	5	22,50
Aricia armiger	Fragm.	0,10
Nephthys sp.	»	0,70
		34,30
		(1,77)

W. of Lehnskov.
10 samples à 0,1 m². — Depth 14 meters.
1912, June 13'.

Note: Little Belt No. 3 is classed among the western Baltic as No. 1.

Western Baltic. a.b.c. Stations, frequently with Cyprina, and sometimes with d.

No. 1. pr. 1 m²	Number	Rough weight
Abra alba	46,4	8,40
Macoma calcarea	4,0	0,56
Corbula gibba	1,2	0,04
Cyprina islandica	2,0	0,12
Nephthys sp.	Fragm.	7,00
Pectinaria Koreni	3,2	0,68
Terebellides Strømi	4,0	0,12
Sabellidæ	Fragm.	
Ophioglypha albida	13,6	0,72
Gastrosaccus spinifer	0,4	0,08
		17,72
		(2,304)

N. of Vejsnæs Flak.
Gray, clay-like, sandy bottom.
Of the dead Lamellibranch-shells only Epidermis is left.
25 samples à 0,1 m². — Depth 30 meters.
Temp. 4,4° C.
1911, May 17'.

No. 2. pr. 1 m²	Number	Rough weight
Abra alba	3,5	0,250
Macoma calcarea	12,0	1,000
Solen pellucidus	1,5	0,200
Astarte sp. juv.	132,0	5,000
Cyprina islandica juv.	0,5	0,025
Modiolaria nigra	0,5	0,050
Nephthys sp.	Fragm.	6,650
Maldanidæ	»	1,000
Terebellidæ	0,5	0,050
Ophioglypha albida	∞	4,900
Gammaridæ	5,5	0,300
Diastylis sp.	5,0	0,100
Mysidæ	0,5	0,025
Ascidiæ	2,5	0,150
		19,700
		(2,07)

3 miles W. S. W. of Gulstav (Langeland).
Light, sand-mixed, tough clay with distinct brown detritus-layer.
20 samples à 0,1 m². — Depth 21 meters.
Temp. 10,0° C.
1911, August 9'.

No. 3. pr. 1 m²	Number	Rough weight
Abra alba 6-13 mm	40,0	4,200
Macoma calcarea 4-8 mm	29,0	4,100
» baltica	3,0	0,750
Corbula gibba	1,5	0,050
Astarte Banksii	10,0	0,450
» elliptica 30 mm	0,5	3,200
Cyprina islandica	2,5	112,500
Cardium fasciatum	1,0	0,100
Buccinum undatum	0,5	0,050
Nephthys sp.	∞	8,150
Maldanidæ	Fragm.	0,150
Terebellidæ	6,0	0,250
Ophioglypha albida	∞	5,600
Diastylis sp.	1,0	0,015
Mysidæ	1,5	0,035
Ascidiæ	∞	62,500
		202,100
		(14,965)

10,5 miles W. S. W. of Gulstav.
Gray, very sandy clay with brown layer, strongly coherent. — A few smaller and larger stones A single sample rejected on accout of too many stones. — Furcellaria, Laminaria and smaller Algae are living here on the stones.
20 samples à 0,1 m². — Depth 18 meters.
Temp. 12,7° C.
1911, August 9'.

No. 4. pr. 1 m²	Number	Rough weight
Abra alba	51,0	1,850
Macoma calcarea	10,0	1,800
» baltica	8,5	1,100
Corbula gibba	2,5	0,050
Astarte sp. juv.	0,5	0,025
Cardium fasciatum	0,5	0,025
Nephthys sp.	Fragm.	5,150
Terebellides Strømi	18,0	0,433
Artacama proboscidea	2,0	1,717
Ophioglypha albida	37,5	7,450
» » juv.	15,0	
Diastylis sp.	0,5	0,005
Ascidiæ	2,5	0,900
		20,505
		(2,195)

11 miles S. by W, ½ W. of Gulstav.
The bottom light gray, somewhat coherent, sandy clay. Distinct brown layer.
20 samples à 0,1 m². — Depth 20 meters.
Temp. 10,5° C.
1911, August 9'.

No. 5. pr. 1 m²	Number	Rough weight
Abra alba	25,0	2,70
Macoma calcarea	25,0	14,20
Astarte Banksii 5-11 mm.	410,0	
» borealis 6-25 mm.	80,0	266,00
» elliptica 7-27 mm.	26,0	
Cyprina islandica	2,0	106,00
Leda pernula juv.	2,0	0,10
Modiolaria nigra	2,0	0,10
Harmothoë sp.	2,0	0,39
Phyllodoce maculata	1,0	0,40
Nephthys sp.	Fragm.	7,11
Maldanidæ	»	0,50
Terebellidæ	27,0	2,00
Priapulus caudatus	1,0	0,10
Ophioglypha albida	40,0	6,00
Gammaridæ	13,0	0,40
Diastylis sp.	1,0	0,01
		406,01
		(19,05)

1 mile S. S. E. of Femerns Light-vessel.
The bottom is gray, with very coarse sand. Somewhat coherent. A few small stones.
10 samples à 0,1 m². — Depth 28 meters.
Temp. 8,7° C.
1911, August 9'.

No. 6. pr. 1 m²	Number	Rough weight
Abra alba	1,5	0,30
Cyprina islandica	1,0	48,20
Nephthys sp.	Fragm.	3,40
Terebellides Strømi	113,0	6,60
Ophioglypha albida	10,0	1,50
Gammaridæ	1,0	0,10
		60,10
		(4,73)

16 miles W. S. W. of Gedser Light-vessel.
Very light, tough and clayey, sandy detritus, with distinct brown layer.
10 samples à 0,1 m². — Depth 24 meters.
Temp. 8,5° C.
1911, August 10'.

No. 7. pr. 1 m²	Number	Rough weight
Nephthys sp.	Fragm.	4,00
Terebellides Strømi	127,0	7,40
Ophioglypha albida	14,0	3,60
Mysidæ	1,0	0,05
		15,05
		(2,41)

1 mile S. of No. 6.
Light, clayey and tough, a little sandy bottom, with brown detritus-layer.
10 samples à 0,1 m². — Depth 24 meters.
1911, August 10'.

No. 10. pr. 1 m²	Number	Rough weight
Abra alba	28,0	5,00
Macoma calcārea	22,0	7,00
Astarte Banksii	7,0	0,80
» elliptica	4,0	
Cyprina islandica	3,0	109,20
Cardium fasciatum	1,0	0,10
Leda pernula juv.	1,0	0,10
Modiolaria nigra	1,0	0,10
Buccinum undatum	2,0	0,40
Nephthys sp.	Fragm.	11,50
Trophonia sp.	»	1,10
Maldanidæ	»	0,10
Terebellidæ	50,0	6,30
Ophioglypha albida	100,0	6,80
Asterias rubens	1,0	0,80
Gammaridæ	2,0	0,10
Diastylis sp.	1,0	0,01
Ascidiæ	4,0	1,10
		150,51 (11,30)

7 miles N. E. ½ N. of Staberhuk Light (Femern). Light, clayey and somewhat sandy bottom with brown detritus-layer.
10 samples à 0,1 m². — Depth 28—30 meters. 1911, August 10'.

No. 11. pr. 1 m²	Number	Rough weight
Abra alba	2,67	0,333
Macoma calcarea	4,00	0,800
» baltica	9,33	2,267
Corbula gibba	2,00	0,067
Astarte Banksii	22,00	3,000
» borealis	36,00	77,067
» elliptica	0,67	0,067
Cardium fasciatum	2,00	0,067
Nereis sp.	0,67	0,067
Nephthys sp.	4,00	1,333
Pectinaria Koreni	1,33	0,267
Ophioglypha albida	3,33	0,600
Asterias rubens	0,67	0,467
Gammaridæ	2,00	0,133
Gastrosaccus spinifer	0,67	0,067
Ascidiæ	222,67	9,000
		95,602 (4,26)

From E. of Slien to W. of Femern.
Hard bottom: From pure sand and gravel with small stones and Algae to sand, mixed with detritus with small stones and Algae.
(St. No. 11 is on the chart at 5 places.)
15 samples à 0,1 m². — Depth 12—17 meters. 1912, June 22'.

No. 12. pr. 1 m²	Number	Rough weight
Abra alba	26,00	4,333
Macoma calcarea	10,67	3,533
» baltica	26,00	5,000
Corbula gibba	3,33	0,067
Astarte Banksii	146,67	30,133
» borealis	8,00	6,667
» elliptica	4,67	0,800
Cyprina islandica	3,33	103,800
Cardium fasciatum	1,33	0,333
Phyllodoce maculata	0,67	0,133
Nereis sp.	0,67	0,200
Nephthys sp.	Fragm.	2,333
Maldanidæ	»	0,067
Terebellides Strømi	4,67	0,333
Artacama proboscidea	2,67	0,333
Halicryptus spinulosus	0,67	0,067
Ophioglypha albida	22,67	3,600
Asterias rubens	0,67	0,267
Gammaridæ	4,00	0,133
Diastylis sp.	1,33	0,067
Ascidiæ	20,00	0,800
		162,999 (8,94)

From N. E. of Slien to N. N. W. of Femern.
Soft bottom: From nearly quivering to sandy ooze, but in places with small stones and red Algae.
(St. No. 12 is on the chart at 7 places.)
15 samples à 0,1 m². — Depth 17—26 meters. 1912, June 22'.

Western Baltic. d. Stations.

No. 8. pr. 1 m²	Number	Rough weight
Macoma baltica	3	0,20
Nephthys sp.	Fragm.	2,30
Artacama proboscidea ...	125	22,40
Ophioglypha albida	8	1,80
Mysidæ	3	0,20
		26,90
		(5,01)

11,5 miles S. by E. of Staberhuk Light (Femern). Dark, garnulous layer below, more light and tough above. Only a little sand.

10 samples à 0,1 m². — Depth 24 meters. Temp. 9,1° C.

1911, August 10'.

No. 9. pr. 1 m²	Number	Rough weight
Macoma baltica	4	0,30
Nephthys sp.	Fragm.	1,40
Artacama proboscidea ...	6	1,30
Mysidæ	4	0,10
		3,10
		(0,57)

6 miles S E. of Dahmerhøft Light.

The bottom a little darker, light gray, only a little sand in the clayey, soft, coherent, somewhat stinking.

10 samples à 0,1 m². — Depth 21 meters. Temp. 8,7° C.

1911, August 10'.

No. 13. pr. 1 m²	Number	Rough weight
Macoma baltica	21	4,00
Mytilus edulis	ca. 400	200,00
Aricia armiger	1	0,10
Gammaridæ	3	0,10
		204,20
		(5,24)

S. of Kramnitze harbour.

Coarse sand with clusters of Mytilus, a few red Algae; in the last sample 1 stone.

10 samples à 0,1 m². — Depth 11 meters.

1912, July 12'.

The true Baltic. d. Stations.

No. 1. pr. 1 m²	Number	Alcohol weight
Macoma baltica	2,0	0,30
Mya sp. juv.....	8,0	0,45
Cardium edule	40,5	24,50
» » juv.....	235,0	9,55
Mytilus edulis.....	9,0	4,75
		39,55
		(0,995)

2,5 miles E. of Bøgestrømmens buoy.
White sand.
20 samples à 0,1 m². — Depth 9,5 meters.
Temp. 8.4° C.
1911, May 29'.

No. 2. pr. 1 m²	Number	Alcohol weight
Macoma baltica	111,25	18,875
Mya sp. juv.....	11,25	1,250
Cardium edule	7,50	9,750
» » juv.....	2,50	0,125
Aricia armiger	Fragm.	0,125
Terebellides Strømi	50,00	0,875
Halicryptus spinulosus...	11,25	0,875
Gammaridæ	2,50	0,125
		32,000
		(1,7125)

10 miles E. of Bøgestrømmens buoy.
Detritus with much sand.
8 samples à 0,1 m². — Depth 22 meters.
1911, May 29'.

No. 3. pr. 1 m²	Number	Alcohol weight
Macoma baltica	12,5	1,30
Mytilus edulis juv.	2,0	0,30
Aricia armiger	Fragm.	0,25
Travisia Forbesi.....	9,0	0,50
Diastylis sp.	1,0	0,05
		2,40
		(0,22)

13 miles E. of Bøgestrømmens buoy.
Fine, hard sand.
20 samples à 0,1 m². — Depth 29 meters.
1911, May 29'.

No. 6. pr. 1 m²	Number	Rough weight
Macoma baltica	33	5,40
Mya sp. juv.	4	0,40
Cardium edule	77	21,40
Mytilus edulis	∞	800,00
Nereis sp.	7	0,50
Gammaridæ	20	0,50
Corophium sp.	10	
Idothea entomon	2	0,60
» baltica	1	0,10
		828,90
		(22,12)

By Falsterbo Light-vessel.
Gravel and small stones with clusters of Mytilus.
10 samples à 0,1 m². — Depth 15 meters.
1912, July 10'.

No. 7. pr. 1 m²	Number	Rough weight
Macoma baltica	43	16,20
Cardium edule	1	0,20
Mytilus edulis	23	1,70
Nereis sp.	1	0,10
Gammaridæ	5	0,10
		18,30
		(0,93)

S. W. of Trelleborg.
Brown gravel and stones.
10 samples à 0,1 m². — Depth 25—26 meters.
1912, July 10'.

No. 8. pr. 1 m²	Number	Rough weight
Macoma baltica	290	80,70
Terebellides Strømi	29	1,50
Halicryptus spinulosus	2	0,20
Actiniidæ	1	0,10
		82,50
		(4,56)

S. of Trelleborg.
The bottom dark, soft, nearly quivering with light upper layer.
10 samples à 0,1 m². — Depth 39 meters.
Temp. 8,0° C.
1912, July 10'.

No. 9. pr. 1 m²	Number	Rough weight
Macoma baltica	3	0,80
Nephthys sp.	1	1,70
Scalibregma inflatum	3	0,20
Terebellides Strømi	ca. 110	8,30
Nemertini	1	0,90
		11,90
		(2,18)

S. S. E. of Trelleborg.
Gray-black, stinking, quivering »Gytje«.
10 samples à 0,1 m². — Depth 46 meters.
Temp. 9,2° C.
1912, July 10'.

No. 4. pr. 1 m²	Number	Alcohol weight
Macoma baltica	14,4	1,56
Astarte borealis < 17 mm	238,8	127,20
» sp. < 16 mm	263,6	161,60
Mytilus edulis < 18 mm .	0,8	0,20
Aricia armiger	Fragm.	0,08
Terebellidæ	26,0	2,00
Priapulus caudatus	0,4	0,04
Gephyrea	6,4	0,32
Gammaridæ	0,8	0,04
Diastylis sp.	2,0	0,08
Ascidiæ juv.	∞	10,80
		303,92
		(8,288)

13 miles E. S. E. of Høje Møen.
Tough, sandy detritus, light, with small stones.
25 samples à 0,1 m². — Depth 40 meters.
Temp. 5,5° C.
1911, May 29'.

No. 5. pr. 1 m²	Number	Alcohol weight
Macoma baltica 5-14,5 mm	56,0	5,60
Astarte sp. 4-19 mm	382,4	104,80
Mytilus edulis < 32 mm .	1,2	1,04
Harmothoë sp.	0,4	0,04
Aricia armiger	Fragm.	0,40
Nephthys sp.	»	0,20
Terebellidæ	8,8	0,92
Gephyrea	3,6	0,20
Gammaridæ	1,2	0,04
Diastylis sp.	1,2	0,04
Ascidiæ juv.	15,6	1,08
		114,36
		(3,188)

13 miles E. S. E. of Høje Møen.
Tough, sandy detritus, light, but fewer stones than No. 4.
25 samples à 0,1 m². — Depth 40 meters.
1911, May 29'.

No. 10. pr. 1 m²	Number	Rough weight
Macoma baltica	100	9,30
Mya arenaria	5	0,40
Astarte borealis	22	13,80
» elliptica	32	12,50
» sp.	128	2,90
Cyprina islandica juv.	5	0,20
Cardium sp.	5	0,30
Mytilus edulis	1	0,10
Harmothoë sp.	Fragm.	0,20
Aricia armiger	»	0,20
Nephthys sp.	1	0,50
Terebellides Strømi	Fragm.	0,60
Diastylis sp.	3	0,20
		41,20
		(1,88)

S. S. E. of Hestehoved Light.
Half soft, gray sand with detritus.
10 samples à 0,1 m². — Depth 18 meters.
1912, July 11'.

No. 1. pr. 1 m²	Number	Rough weight
Abra nitida	4,0	0,120
Macoma calcarea	1,4	2,440
Corbula gibba	0,2	0,002
Cyprina islandica	3,0	140,000
» » juv.	0,8	0,020
Cardium echinatum	0,2	5,100
Axinus flexuosus	2,4	0,120
Montacuta ferruginosa	0,6	0,020
Leda pernula	36,0	15,700
Nucula tenuis	6,6	0,860
Modiolaria nigra	0,2	0,560
Modiola modiolus	0,2	30,700
Natica grønlandica	0,6	0,460
Aporrhais pes pelecani	0,4	1,360
Turritella terebra	1,0	0,280
Philine scabra	1,4	0,040
Dentalium entalis	0,2	0,100
Aphrodite aculeata	0,4	0,200
Lepidonotus squamatus	Fragm.	0,890
Lumbrinereis fragilis	»	3,560
Goniada maculata	»	0,020
Nephthys sp.	»	3,560
Trophonia plumosa	0,6	0,870
Terebellidæ	Fragm.	2,000
Nemertini	»	2,180
Ophiopholis aculeata	0,2	0,160
Amphiura Chiajei	1,8	0,240
» filiformis	∞	1,780
Ophioglypha albida	∞	3,900
» texturata	1,2	0,740
» robusta	0,6	0,080
Astropecten Mülleri	0,2	0,780
Echinocardium cordatum	11,4	100,000
Echinus sp.	0,2	0,002
Phyllophorus pellucidus	0,2	1,500
Psolus phantapus	0,4	55,360
Gammaridæ	11,4	0,420
Diastylis sp.	0,6	0,020
Mysidæ	0,2	0,002
Crangon sp.	0,2	0,120
Eupagurus Bernhardus	0,2	0,900
Virgularia mirabilis	4,2	0,340
		377,506
		(30,23)

N. of Hven.
Gray, tough, sandy detritus.
50 samples à 0,1 m². — Depth 21—31 meters.
1911, June 12'.

No. 4. pr. 1 m²	Number	Rough weight
Abra alba	1	0,60
» nitida	1	
Axinus flexuosus	2	0,10
Leda pernula	6	3,20
» minuta	12	
Nucula nucleus	2	1,30
» tenuis	4	
Modiola modiolus	160	10000,00
Buccinum undatum	2	27,50
Trochus cinerareus	1	0,50
Chiton sp.	2	0,70
Lepidonotus squamatus	9	8,00
Lumbrinereis fragilis	1	0,90
Nephthys sp.	Fragm.	7,30
Trophonia plumosa	17	20,10
Eumenia crassa	1	0,90
Pectinaria sp.	1	0,01
Ampharetidæ	Fragm.	0,60
Terebellidæ	»	1,70
Balanoglossus Kuppferi	2	0,20
Ophiopholis aculeata	∞	66,00
Ophioglypha robusta	360	30,90
Asterias rubens	2	0,50
Echinocardium cordatum.	5	40,50
Str. drøbakiensis	11	51,50
Gammaridæ	6	0,10
Balanidæ	7	60,00
		10323,11
		(628,37)

W. of Knæhagens buoy.
Detritus between Modiola.
10 samples à 0,1 m². — Depth 28 meters.
1911, June 13'.

The Sound. (E. T.) Stations.

No. 2. pr. 1 m²	Number	Rough weight
Abra nitida	9,4	0,54
Macoma calcarea 4-28 mm	42,0	18,06
Mya truncata juv.	4,0	0,52
Corbula gibba	9,4	0,40
Solen pellucidus	0,4	0,04
Astarte Banksii }	2,8	0,98
» elliptica }		
Cyprina islandica	0,4	33,20
» » juv.	1,4	0,66
Cardium fasciatum	3,4	0,12
Axinus flexuosus < 7 mm	10,4	0,78
Leda pernula juv.	2,2	0,18
Nucula tenuis	4,2	0,40
» nitida	0,4	0,08
Modiolaria nigra	0,8	0,26
Neptunea antiqua	0,2	7,40
Nassa reticulata	0,2	0,04
Natica grønlandica	0,2	0,02
Nephthys sp.	Fragm.	21,20
Maldanidæ	»	0,22
Pectinaria auricoma	0,4	0,10
Terebellides Strømi	Fragm. }	1,02
Artacama proboscidea	» }	
Ophioglypha albida	4,0	0,50
» texturata	0,2	0,10
» robusta	0,8	0,02
Asterias rubens	0,2	3,04
Echinocardium cordatum.	1,0	11,12
Phyllophorus pellucidus	0,4	1,92
Diastylis sp.	4,8	0,06
		102,98 (9,972)

S. W. of Hven.
Light, sandy, clayey detritus.
A few loose red Algae.
50 samples à 0,1 m². — Depth 14—18 meters.
Temp. 7,6° C.
1911, June 12'.

No. 9. pr. 1 m²	Number	Rough weight
Abra nitida	7	0,50
Mya sp.	9	0,30
Corbula gibba	1	0,05
Cyprina islandica juv.	3	0,10
Cardium fasciatum	4	0,40
Axinus flexuosus	2	0,30
Leda pernula	120	23,50
Nucula tenuis	26	3,10
Natica grønlandica	1	0,20
Lumbrinereis fragilis	Fragm.	4,60
Nephthys sp.	»	2,00
Terebellidæ	»	3,60
Ophioglypha albida	32	4,30
» texturata	2	2,80
» robusta	15 }	0,70
» affinis	3 }	
Echinocardium cordatum.	1	12 20
Diastylis sp.	2	0,05
Mysidæ	1	0,10
		58,80 (4,81)

S. of Hven.
Dark, very soft, a little sandy lower layer with brown upper layer.
10 samples à 0,1 m². — Depth 21 meters.
Temp. 9,2° C.
1911, August 21'.

The Sound. a. b. c. Stations with d.

No. 3. pr. 1 m²	Number	Rough weight
Abra alba	2,0	0,20
Macoma calcarea 5-22 mm	61,6	14,96
» baltica	0,4	0,04
Mya truncata	35,2	7,76
Corbula gibba	21,2	1,00
Cyprina islandica	2,0	100,00
» » juv.	5,6	2,08
Cardium fasciatum	6,8	0,20
Modiolaria nigra	0,8	0,16
Mytilus edulis 32-48 mm	2,4	13,68
Nassa reticulata	5,6	3,20
Acera bullata	3,2	0,52
Nephthys sp.	Fragm.	13,24
Arenicola marina	0,4	0,68
Pectinaria sp.	1,2	0,28
Terebellides Strømi	ca. 200,0	5,24
Echinocyamus pusillus	2,0	0,04
Gammaridæ }	16,8	0,40
Diastylis sp. }		
		163,68 (12,336)

N. W. of Hven and E. S. E. of Slettens harbour.
Brown upper layer, gray bottom, consisting of sand and small stones, with some detritus. Laminaria, and other Algae, black remains of Zostera.
25 samples à 0,1 m². — Depth 12,2—14 meters.
1911, June 13'.

No. 7. pr. 1 m²	Number	Rough weight
Abra alba	28,8	4,760
Macoma calcarea 3-21 mm	184,0	36,840
» baltica	3,2	0,320
Mya sp.	0,4	0,040
Corbula gibba	0,8	0,080
Astarte sp.	2,0	2,480
Cardium sp.	0,4	0,004
Axinus flexuosus	12,8	0,520
Bela turricula	0,4	0,080
Nephthys sp.	Fragm.	21,440
Maldanidæ	»	0,160
Pectinaria sp.	0,4	0,200
Terebellides Strømi	1,2	0,200
Gammaridæ	1,6	0,080
Diastylis sp.	2,0	
Ascidiæ	2,8	1,240
		68,444 (8,496)

Lomma Bay.
Very tough, light and clayey bottom, with scattered, smaller stones.
25 samples à 0,1 m². — Depth 14—16 meters.
1911, June 15'.

No. 5. pr. 1 m²	Number	Rough weight
Macoma baltica juv.	29,8	0,84
Mya sp. juv.	8,4	0,50
Cardium edule	1,8	3,06
» » juv.	42,4	2,60
» exiguum juv.		
Mytilus edulis 7-30 mm	330,0	20,00
Nassa reticulata	1,0	0,36
Littorina littorea	6,4	1,82
Lacuna divaricata	0,2	0,01
Hydrobia sp.	7,6	0,08
Rissoa sp.	0,2	0,01
Aricia armiger	Fragm.	0,06
Gammaridæ	1,2	0,03
Idothea sp.	0,2	0,01
		29,38 (1,144.

E. of Slettens harbour.
Pure sand with Zostera in places, a few red Algae.
50 samples à 0,1 m². — Depth 7—9 Meters.
1911, June 14'.

No. 6. pr. 1 m²	Number	Rough weight
Macoma baltica 4-12 mm	10,2	0,88
Mya sp.	1,4	0,10
Cardium edule 12-15 mm	0,6	0,40
» » juv. 3-7 mm	9,6	0,46
» exiguum	0,4	0,02
Mytilus edulis 7-45 mm	46,0	88,00
Littorina littorea	2,4	0,62
» tenebrosa juv.	62,0	1,60
Hydrobia sp.	11,0	0,02
Rissoa sp	6,0	0,02
Aricia armiger	0,4	0,04
Gephyrea	0,2	0,02
Gammaridæ	8,6	0,40
Idothea sp.	1,6	0,02
Mysidæ	0,6	0,10
		92,70 (2,476)

E. of Slettens harbour.
Sand with more compact Zostera in places than on St. No. 5.
50 samples à 0,1 m². — Depth 5 meters.
1911, June 14'.

Sealand archipelago. d. Stations

No. 8. pr. 1 m²	Number	Rough weight
Macoma baltica 3-11 mm .	49	5,20
Mya sp.	15	0,60
Cardium edule 3,5-11 mm.	10	0,90
» exiguum	12	
Mytilus edulis	ca. 310	247,80
Littorina littorea	10	2,40
Hydrobia sp.	4	0,05
Arenicola marina	1	0,40
Gephyrea	1	0,20
Gammaridæ	20	0,20
Idothea sp.	6	0,10
Mysidæ	1	0,05
		257,90
		(4,84)

Off Espergærde.
Dark sand with Zostera (green).
10 samples à 0,1 m². — Depth 4—5 meters.
1911, August 19'.

No. 1. pr. 1 m²	Number	Rough weight
Macoma baltica	9,0	1,45
» » juv.	1,0	0,05
Cardium exiguum	1,5	0,10
Mytilus edulis	∞	56,50
» » juv.	77,5	3,25
Littorina tenebrosa	51,0	2,05
Hydrobia ulvæ	9,0	0,05
Rissoa membranacea	10,0	0,10
Neritina fluviatilis	20,5	1,05
Ascidiæ	5,0	6,00
		70,60
		(2,24)

S. of Askø.
Zostera and sand.
20 samples à 0,1 m². — Depth 3—4 meters.
1911, May 26'.

No. 2. pr. 1 m²	Number	Rough weight
Macoma baltica	35,0	8,55
Cardium exiguum	3,5	0,15
Mytilus edulis juv.	32,5	20,00
Littorina littorea	3,5	1,70
» tenebrosa	25,0	1,60
Hydrobia ulvæ	14,5	0,40
Rissoa membranacea	10,0	0,10
Acera bullata	4,0	0,55
Neritina fluviatilis	15,0	0,60
Aricia armiger	Fragm.	0,25
Nereis sp.	1,0	0,55
Gephyrea	2,0	0,45
Tipula-Larvæ	5,5	0,20
Gammaridæ	3,5	0,40
Idothea sp.	1,0	0,05
Ascidiæ juv.	1,0	1,00
Gobius sp.	1,5	0,55
		37,10
		(1,78)

W. of Fæmø.
Zostera and sand.
20 samples à 0,1 m². — Depth 5—6 meters.
1911, May 26'.

No. 3a. pr. 1 m²	Number	Rough weight
Macoma baltica	42	13,00
Mya arenaria	26	113,00
Cardium edule	9	8,00
Nereis sp.	3	0,50
Arenicola marina	70	141,00
		275,50
		(39,70)

By Guldborg ferry. E.
Sandy bottom, by low-tide.
In the sand were many remains of Zostera, which were retained by the sieves.
In places were Hydrobia and Corophium to be seen, but not in larger quantities pr. m².
1 m² digged up.
1911, May 26'.

No. 3b. pr. 1 m²	Number	Rough weight
Macoma baltica	70	21,30
Mya arenaria	20	126,00
» » juv.	∞	28,00
Cardium edule	58	40,70
Mytilus edulis	24	25,40
Arenicola marina	17	38,50
Idothea sp.	27	0,80
		280,70
		(26,10)

By Guldborg ferry. E.
Sandy bottom with short Zostera (small stones below). Low-tide.
1 m² digged up.
1911, May 27'.

No. 4. pr. 1 m²	Number	Rough weight
Macoma baltica	66	11,40
» » juv.	16	0,90
Cardium exiguum	94	2,40
Mytilus edulis	71	24.50
» » juv.	82	3,50
Littorina tenebrosa	43	1,70
Hydrobia ulvæ v. stagnalis	128	2,10
Rissoa membranacea	60	0,80
Neritina fluviatilis	353	6,10
Nereis sp.	4	0,70
Gammaridæ	3	0,30
Idothea sp.	3	
		54,40
		(2,19)

Farø Jord.
Zostera-bottom; sandy with detritus.
10 samples à 0,1 m². — Depth 4 meters.
1911, May 27'.

Sealand archipelago. d. Stations, also with b.

No. 8. pr. 1 m²	Number	Rough weight
Macoma baltica	7	0,80
Mya arenaria	1	0,10
Cardium edule	2	0,40
» exiguum	6	0,10
Mytilus edulis < 40 mm.	ca. 800	150,00
Littorina tenebrosa	15	0,30
Hydrobia sp.	13	0,20
Neritina fluviatilis	2	0,20
Aricia armiger	Fragm.	0,10
Gammaridæ	4	0,10
Idothea sp.	4	0,20
		152,50
		(3,91)

Northern coast of Falster.
Sand and Gravel with Zostera (Zostera-region).
10 samples à 0,1 m². — Depth 0—10 meters.
1912, April 23'.

No. 5. pr. 1 m²	Number	Rough weight
Abra alba	2,25	0,100
Macoma baltica	95,50	13,250
Mya sp. juv.	27,50	2,175
Scrobicularia plana	36,00	56,875
» » juv.	12,00	0,375
Cardium edule	24,00	7,925
» fasciatum	2,25	0,125
» exiguum	0,75	0,050
Mytilus edulis < 4 cm	6,50	11,575
Hydrobia sp.	22,25	0,275
Utriculus obtusus	1,50	0,0375
Aricia armiger	Fragm.	0,600
Nephthys sp.	»	2,550
Pectinaria Koreni	2,00	0,425
Terebellides Strømi	Fragm.	3,025
Halicryptus spinulosus	3,00	0,525
Asterias rubens	0,50	0,050
Gammaridæ	2,25	0,075
Idothea sp.	0,25	0,025
Diastylis sp.	3,75	0,125
Gastrosaccus spinifer	0,75	0,050
		100,2125
		(5,79)

Karrebæksminde Bay. E.
The bottom consists of dark, sand-mixed clay. Easy to sieve.
(St. No. 5 is on the chart at 4 places.)
40 samples à 0,1 m². — Depth 11—12 meters.
1912, April 20'—23'.

No. 6. pr. 1 m²	Number	Rough weight
Abra alba	26,00	5,050
Macoma baltica	53,75	7,900
Corbula gibba	0,25	0,0125
Solen pellucidus	0,50	0,025
Cyprina islandica juv.	0,25	0,025
Cardium edule	0,50	0,010
» fasciatum	5,75	0,100
Hydrobia sp.	1,25	0,025
Philine aperta	0.25	0,025
Aricia armiger	Fragm.	0,075
Nephthys sp.	»	4,025
Arenicola marina	0,25	0,375
Pectinaria Koreni	0,50	0,250
Terebellides Strømi	Fragm.	0,475
Artacama proboscidea	0,75	0,700
Ophioglypha albida	4,25	0,800
Diastylis sp.	0,50	0,025
Gastrosaccus spinifer	1,00	0,075
Crangon sp.	0,25	0,075
		20,0475
		(2,03)

Karrebæksminde Bay. W.
Dark, clayey, soft bottom. — Easy to sieve.
(St. No. 6 is on the chart at 3 places.)
40 samples à 0,1 m². — Depth 12—14 meters.
1912, April 20'—23'.

Sealand archipelago. c. Stations.

No. 7. pr. 1 m²	Number	Rough weight
Macoma calcarea	50	66,70
Nephthys sp.	Fragm.	9,20
Trophonia plumosa	1	1,50
Arenicola marina	Fragm.	2,50
Pectinaria Koreni	1	0,80
Terebellides Strømi	Fragm.	0,60
Ophioglypha albida	14	0,80
Asterias rubens	1	3,00
Diastylis sp.	2	0,10
Gastrosaccus spinifer	1	0,10
Ascidiæ.....	∞	31,30
		116,60 (12,21)

Agersø channel.
The bottom: From gravel with small stones to mud with dead Zostera.
10 samples à 0,1 m². — Depth 25—50 meters.
1912, April 20'.

Isefjord. d. Stations.

No. 3. pr. 1 m²	Number	Rough weight
Macoma baltica	90,5	29,600
Mya arenaria }	∞	205,000
» » juv. }		
Cardium edule	49,5	34,150
Mytilus edulis.....	∞	300,000
Rissoa membranacea.....	2,0	0,005
Neritina fluviatilis	3,0	0,050
Nemertini	0,5	0,005
Tipula Larvæ	4,0	0,005
Gammaridæ	2,0	0,050
		568,865 (31,31)

Great Bredning of Roskildefjord.
Black, stinking, quivering detritus with brown layer. Lots of dead Mya- and Cardium-shells.
20 samples à 0,1 m². — Depth 4—5 meters.
1911, June 17'.

No. 4. pr. 1 m²	Number	Rough weight
Macoma baltica	2,0	1,160
Scrobicularia plana	0,4	3,200
Cardium exiguum	12,0	0,320
Modiolaria discors	1.2	0,200
Mytilus edulis.....	0,4	0,004
Rissoa menbranacea	1,6	0,060
Utriculus sp.	0,4	0,020
Harmothoë imbricata	0,4	0,040
Nephthys sp.	Fragm.	0,040
Arenicola marina.....	0,8	0,040
Nemertini.....	Fragm.	0,040
Asterias rubens	2,8	8,000
Tipula-Larvæ	17,6	0,320
Gammaridæ	8,4	0,130
Idothea	1.2	0,020
Mysidæ	2,0	0,050
*Ciona canina.....	∞	100,000
** » » juv.....	∞	80,000
		193,644 (15,832)

* On the dead Zostera.
** On the growing Zostera.

Holbækfjord, W. of Rønnen.
The bottom very dark, with much dead Zostera. High, new Zostera. — Lots of shells of Mytilus, Scrobicularia, Corbula and small snails.
25 samples à 0,1 m². — Depth 3—4 meters.
1911, June 19'.

No. 5. pr. 1 m²	Number	Rough weight
Macoma baltica	0,5	0,200
Nephthys sp.	7,0	0,600
Tipula-Larvæ	0,5	0,005
Crangon vulgaris	0,5	0,650
		1,455 (0,175)

Holbækfjord. E. of Rønnen.

Loose, stinking, black bottom, with a thin, but deep brown, layer. — Many dead shells of Scrobicularia, Macoma baltica, Mya, Corbula, Nassa.

No Zostera.

Scarcely any living animals.

Corbula-shells were present in great numbers, as also in the great bredning of Isefjord. They usually were small, ca. 2 years old. — In the channel by the buoy the bottom is hard, and many subfossile oyster-shells were taken up with the bottom-sampler.

20 samples à 0,1 m². — Depth 5 – 6 meters.

1911, June 19'.

No. 6. pr. 1 m²	Number	Rough weight
Corbula gibba	0,5	0,005
Mytilus edulis.....	78,0	1960,000
Spionidæ	Fragm.	0,050
Pectinaria Koreni	2,0	0,010
Asterias rubens	1,5	55,000
		2015,065 (52,97)

Bramsnæsvig.

The bottom quivering. Very slight brown layer. Dead shells of Scrobicularia, Mytilus, Mya arenaria, Nassa, great, old Corbula, Cardium edule and Macoma baltica; scarcely any living animals, only 1—2 small worms; but in places numbers of great living Mytilus edulis, with Asterias, which were eating them; the closing muscles not yet eaten.

Here only few dead shells are obtained except of Mytilus.

Eels are caught on hooks at this time. The hooks cannot be used on the ground because the crabs will eat the bait.

The eels feed on Mytilus, but do not take the shells.

20 samples à 0,1 m². — Depth 7—8 meters.

1911, June 17'.

Isefjord. Very much reduced v. Stations.

No. 1. pr. 1 m²	Number	Rough weight
Corbula gibba	1,2	0,020
Solen pellucidus	1,8	0,240
Nephthys sp.	Fragm.	0,460
Arenicola marina	0,2	0,020
Pectinaria Koreni	1,2	0,220
Nemertini	0,2	0,060
Ophioglypha texturata	18,4	7,700
Asterias rubens	2,8	1,640
Gammaridæ	0,2	0,002
Diastylis	5,4	0,120
Ciona canina	∞	173,000
		183,482
		(14,932)

Great Bredning, different places.
The bottom soft, loose, dark, gray-green, quivering with faint brown layer.
50 samples à 0,1 m².
1911, June 16'.

No. 2. pr. 1 m²	Number	Rough weight
Tellina fabula	14	0,30
Corbula gibba	15	0,10
Thracia papyracea	64	15,90
Solen pellucidus	61	8,80
Cardium fasciatum	31	1,10
Nassa reticulata	4	4,20
Aricia armiger	Fragm.	1,40
Nephthys sp.	»	2,80
Pectinaria Koreni	∞	30,70
Gephyrea	20	1,40
Asterias rubens	5	3,40
Gammaridæ	210	11,70
		81,80
		(10,35)

By the balloon-jib.
Sandy bottom.
10 samples à 0,1 m². — Depth 10 meters.
1911, June 16'.

The Skagerak (Kattegat),

No. 17. pr. 1 m²	Number	Rough weight
Abra nitida	7,0	
Solen pellucidus	1,0	
Montacuta ferruginosa	2,0	5,50
Leda minuta	7,0	
Modiolaria nigra	3,0	
Turritella terebra	3,0	3,40
Cylichna cylindracea	7,0	1,00
Dentalium entalis	2,0	0,50
Aphrodite aculeata	6,0	15,20
Eumenia crassa	6,0	6,40
Lumbrinereis fragilis	+	
Maldanidæ	∞	
Myriochele Heeri	∞	5,00
Ammochares assimilis	∞	
Pectinaria auricoma	∞	
Sabellidæ	+	
Phascolosoma	3,0	3,00
Amphiura Chiajei	+	340,00
» filiformis	∞	
Ophioglypha albida	2,0	0,10
» texturata	1,0	2,70
Brissopsis lyrifera	14,0	310,00
Echinocardium flavescens	8,0	115,00
» » juv.	2,0	2,50
Cucumaria sp.	2,0	1,20
Gammaridæ	3,0	0,20
Diastylis Rathkei	50,0	2,60
		814,30 (26,04)

3 miles N. of Skagens Light-vessel.
The bottom strongly coherent sand with fine particles among it. A very destinct uppermost layer. In the lower parts bluish-black particles.
10 samples à 0,1 m². — Depth 90 meters.
Temp. 10,0° C.
1911, July 8'.

No. 18. pr. 1 m²	Number	Rough weight
Abra longicallis 18 mm	1,0	0,10
» nitida < 15 mm	377,0	60,00
Axinus flexuosus < 16 mm	29,0	12,50
Leda pernula 8-24 mm	48,0	8,50
Nucula tenuis < 7 mm	30,0	1,50
Leanira tetragona	Fragm.	3,80
Aricia norvegica	»	11,40
Nephthys sp.	1,0	3,80
Myriochele Heeri	+	0,10
Pectinaria auricoma	3,0	0,30
Melinna cristata	+	0,10
Ophioglypha Sarsii	1,0	4,30
Brissopsis lyrifera 12-40 mm	30,0	304,00
		410,40 (21,64)

13 miles N. N. E. of Skagens Light-vessel.
The bottom: Kattegat-clay with brown upper layer; very dark in the lowest layers.
Remains of Zostera.
10 samples à 0,1 m². — Depth 160—173 meters.
Temp. 7,0° C.
1911, July 8'.

No. 45. pr. 1 m²	Number	Rough weight
Corbula gibba	1	0,10
Venus gallina	2	0,20
Leda minuta	1	0,10
Nucula tenuis	1	0,10
Turritella terebra	20	18,80
Dentalium entalis	3	2,20
Glycera Goësi	9	3,10
Nephthys sp.	Fragm.	1,30
Brada villosa	»	3,50
Eumenia crassa	22	35,50
Notomastus latericius	ca. 30	5,50
Ampharetidæ	1	0,10
Maldanidæ	6	0,60
Ammochares assimilis	2	0,20
Pectinaria auricoma	14	1,20
» belgica	2	0,50
Nemertini	Fragm.	0,20
Amphiura Chiajei	ca. 25	311,50
» filiformis	ca. 500	
Brissopsis lyrifera	25	660,00
Echinocardium cordatum	7	106,80
Cucumaria pentactes	7	4,00
Synapta inhærens	Fragm.	0,70
Moera Loveni	7	0,70
Crangon Allmani	1	0,10
		1157,00 (81,84)

4,5 miles E. ½ N. of Skagen.
Kattegat-clay.
10 samples à 0,1 m². — Deptb 53 meters.
1912, September 3'.

Gullmarfjord.

No 2-6. pr. 1 m²	Number	Rough weight
Abra nitida	12,0	0,760
Corbula gibba	1,2	0,200
Dosinia sp.?	0,4	1,160
Astarte sp.	4,4	0,800
Cardium sp.	1,6	0,016
Axinus flexuosus	60,0	2,320
Portlandia lucida	2,4	0,060
Leda pernula	20,0	11,560
Nucula tenuis	4,8	9,000
» sulcata	21,2	
Turritella terebra	1,2	0,320
Philine sp.	0,4	0,040
Lætmonice filicornis	0,4	2,600
Lumbrinereis fragilis	Fragm.	1,190
Glycera sp.	3,2	1,190
Aricia sp.	Fragm.	1,190
Nephthys sp.	»	2,750
Eumenia crassa	»	13,800
Maldanidæ	»	0,800
Pectinaria sp.	1,2	1,000
Melinna cristata	Fragm.	4,240
Nemertini	»	4,680
Amphiura Chiajei	45,2	8,920
» filiformis	1,2	0,040
Brissopsis lyrifera	5,2	60,000
Cucumaria pentactes	0,4	0,160
Amphipoda	0,4	0,080
Ascidiæ	0,4	0,240
		129,116
		(10,68)

Bornø to Lysekil.
Light blue-clay, as in Kattegat.
25 samples à 0,1 m². — Depth 40—110 meters.
Temp. 6—6,5° C.
1911, June 23'—24'.

No. 9. pr. 1 m²	Number	Alcohol weight
Abra nitida	11	
Corbula gibba	1	
Solen pellucidus	1	ca. 6,00
Axinus flexuosus	8	
Nucula sulcata	11	
Lumbrinereis fragilis	3	6,00
Glycera sp.	+	
Goniada maculata	+	1,00
Eumenia crassa	1	
Maldanidæ	Fragm.	1,50
Ammochares assimilis	+	
Pectinaria sp.	1	0,40
Ampharetidæ	+	
Nemertini	1	0,10
Amphiura Chiajei	13	1,50
Ophioglypha affinis	2	
Gammaridæ	2	0,01
		16,51
		(2,02)

S. of Ladholmen, Färlefjord.
Light clay with brown upper layer.
10 samples à 0,1 m². — Depth ca. 40 Meters.
Temp. 6,4° C.
1911, June 24'.

No. 7. pr. 1 m²	Number	Rough weight
Venus gallina	1	0,80
Cyprina islandica	3	170,00
» » juv.	2	0,10
Nucula nitida	37	3,10
Aporrhais pes pelecani	4	16,00
Cylichna sp.	1	0,10
Phyllodoce maculata	1	0,10
Glycera sp.	1	0,10
Goniada maculata	3	1,10
Nephthys sp.	Fragm.	2,80
Terebellides Strømi	»	4,10
Artacama proboscidea	»	
Gephyrea	1	0,10
Amphiura filiformis	42	ca. 4,00
Gammaridæ	7	ca. 0,20
Ascidiæ	1	1,20
		203,80
		(13,19)

Färlefjord.
Light clay with distinct brown layer, small stones.
10 samples à 0,1 m². — Depth 18—19 meters.
Temp. 10,5° C.
1911, June 24'.

No. 8. pr. 1 m²	Number	Alcohol weight
Abra alba	1	3,90
Corbula gibba	32	
Solen pellucidus	1	
Nucula nitida	5	
Nassa reticulata	6	3,10
Hydrobia sp.	1	
Philine sp.	10	
Nephthys sp.	Fragm.	5,60
Terebellides Strømi	ca. 30	2,80
Gammaridæ	1	0,10
Diastylis sp.	3	
		15,50 (2,11)

Inmost in Färlefjord. N. of Ladholmen.
Dark clay with brown layer, without vegetation.
10 samples à 0,1 m². — Depth 7 meters.
1911, June 24'.

No. 1. pr. 1 m²	Number	Alcohol weight
Macoma baltica	11	2,70
Corbula gibba	1	0,01
Nassa reticulata	10	4,00
Philine sp.	1	0,20
Arenicola marina	2	0,60
Echinus miliaris	2	0,70
Diptera-Larvæ	20	0,20
Gammaridæ	2	0,10
Carcinus mænas juv.	1	0,30
		8,81 (0,79)

Holma pier.
Soft bottom. — Dead and living Zostera.
10 samples à 0,1 m². — Depth 5—7 meters.
1911, June 24'.

The North Sea.

No. 1. pr. 1 m²	Number	Alcohol weight
Abra nitida	1,2	0,12
Tellina pusilla	10,4	0,40
Solen ensis	0,8	0,28
» siliqua	0,4	0,88
Mactra solida	2,0	1,92
Venus ovata	0,4	0,04
Dosinia exoleta?	1,6	0,20
Astarte sp.	0,4	0,12
Cyprina islandica	0,8	1,64
Natica pulchella	2,4	0,08
Phyllodoce maculata, Glycera capitata, Aricia armiger, Ophelia limacina	6,4	0,52
Nephthys sp.	2,0	1,44
Ophioglypha albida	8,8	1,84
» affinis	0,4	0,04
Astropecten Mülleri	0,4	1,44
Asterias rubens	0,4	0,20
Spatangus purpureus	1,6	1,32
Echinocardium flavescens.	1,2	1,24
Echinocyamus pusillus	33,6	2,08
Bathyporeia norvegica	4,0	0,08
Gastrosaccus spinifer	1,2	0,08
Amphioxus lanceolatus	0,4	0,04
Dissolved in Alcohol		0,76
		16,76 (1,684)

15 miles N. by W. $^1/_4$ W. of Thyborøn channel. Coarse sand and gravel with small stones, without distinct brown layer. The bottom-sampler digged ca. 3 cm into the sand.
25 samples à 0,1 m². — Depth 30—32 meters. Temp. 8,5° C.
1911, July 13'.

No. 2. pr. 1 m²	Number	Alcohol weight
Abra nitida	1,0	0,10
Solen ensis	0,5	0,05
Mactra solida	3,5	5,75
Venus gallina	0,5	0,50
Dosinia exoleta?	0,5	0,05
Natica pulchella	1,0	0,05
Leanira tetragona	0,5	0,10
Leodice norvegica	0,5	0,10
Onuphis conchylega	Fragm.	0,30
Eone Nordmanni	0,5	0,05
Nephthys sp.	0,5	0,55
Ophioglypha albida	9,0	1,00
» affinis	ca. 43,0	0,40
Spatangus purpureus	1,5	31,10
Echinocardium flavescens.	5,0	51,50
Echinocyamus pusillus	6,5	0,50
Gammaridæ	9,5	0,25
Diastylis Rathkei	0,5	0,05
Eupagurus Bernhardus	0,5	0,15
Dissolved in Alcohol		1,80
		94,35 (4,22)

35 miles N. by W. $^1/_4$ W. of Thyborøn channel. Coarse sand and gravel without stones and without distinct brown layer. — The bottom-sampler digged ca. 3 cm into the sand. — Many dead, great Mactra-shells.
20 samples à 0,1 m². — Depth 53 meters. Temp. 8,0° C.
1911, July 13'.

No. 3. pr. 1 m²	Number	Alcohol weight
Abra prismata	6	0,50
Solen ensis	4	0,20
Venus ovata	1	1,40
Astarte Banksii	2	1,70
» sp.	2	10,00
Cardium fasciatum	1	0,10
Leda minuta	1	0,30
Nucula tenuis	4	0,10
Neptunea antiqua	1	0,50
Natica islandica	1	0,20
Dentalium entalis	10	2,50
Onuphis conchylega	14	2,00
Ammochares assimilis	1	0,20
Lanice conchylega	1	0,20
Ophiopholis aculeata	2	0,40
Amphiura filiformis	5	1,00
Ophioglypha albida	2	0,10
Echinocyamus pusillus	1	0,10
Psolus phantapus	1	1,50
Gammaridæ	36	2,00
Eupagurus Bernhardus	1	0,40
Thujaria thuja	2	7,50
Lafoëa dumosa	1	
Cellaria fistulosa	1	
Filograna implexa	1	
Cellepora acicularis	1	
Ascidiæ	1	6,50
Dissolved in Alcohol		5,60
		45,00 (12,26)

53 miles N. by W. $^1/_4$ W. of Thyborøn channel. Sand with a little clay, no distinct brown layer. The bottom-sampler digged ca. 3 cm into the bottom.
10 samples à 0,1 m². — Depth 110—115 meters. Temp. 10,0° C.
1911, July 13'.

No. 4. pr. 1 m²	Number	Alcohol weight
Abra longicallis	1,3	0,750
Cardium minimum	17,5	0,250
Axinus flexuosus	27,5	1,125
Leodice norvegica	6,3	0,125
Lumbrinereis fragilis	Fragm.	0,250
Glycera capitata	5,0	0,125
Aricia sp.	8,8	0,500
Nephthys sp.	3,8	0,250
Ophelia limacina	3,8	0,500
Ammotrypane aulogaster.	10,0	0,625
Travisia Forbesi	11,3	1,125
Maldanidæ	Fragm.	0,250
Ammochares assimilis	5,0	0,125
Phascolosoma	125,0	1,250
Nemertini	7,5	0,375
Amphilepis florifera (norvegica)	7,5	0,250
Crangon sp.	1,3	0,875
Dissolved in Alcohol		2,125
		10,875 (3,35)

60 miles N. by W. $^1/_4$ W. of Thyborøn channel. Light clay without distinct brown layer (which perhaps is washed away). — The bottom-sampler digged ca. 8 cm into the bottom.
8 samples à 0,1 m². — Depth 275—280 meters. Temp. 6,5° C.
1911, July 13'.

No. 5. pr. 1 m²	Number	Alcohol weight
Abra prismatica	6,5	0,45
Thracia papyracea	0,5	0,05
Solen pellucidus	0,5	0,05
» ensis	2,5	0,05
Mactra subtruncata	0,5	0,05
Psammobia færøensis	0,5	0,05
Venus gallina	2,5	0,10
Astarte Banksii	0,5	0,05
Cyprina islandica juv.	0,5	0,05
Cardium minimum	1,0	0,05
» norvegicum	0,5	24,30
Montacute ferruginosa	0,5	0,05
Nucula tenuis	0,5	0,05
Natica pulchella	1,5	0,05
Bela turricula	0,5	0,05
Harmothoë imbricata	0,5	0,10
Nephthys sp.	Fragm.	0,60
Glycera capitata	1,0	
Aricia sp.	2,0	
Ophelia limacina	2,5	0,35
Ammotrypane aulogaster.	0,5	
Travisia Forbesi	1,5	
Amphiura filiformis	1,0	0,05
Ophioglypha albida	1,0	0,05
» affinis	ca. 75,0	0,70
Asterias sp.	2,5	0,05
Spatangus purpureus	1,5	30,75
Echinocardium flavescens juv.	ca. 50,0	0,60
Echinocyamus pusillus	7,5	0,15
Ampelisca macrocephala	0,5	0,05
Bathyporeia sp.	1,0	0,05
Gastrosaccus spinifer	0,5	0,05
Portunus sp.	1,5	0,10
Crangon sp.	1,5	0,05
Actiniidæ	0,5	0,20
Dissolved in Alcohol		2,70
		62,05 (5,765)

Ca. 50 miles W. by S. $^1/_2$ S. of Thyborøn channel. Coarse brownish yellow gravel without distinct brown layer.
20 samples à 0,1 m². — Depth 40 meters.
1911, August 29'. Temp. 12,2° C.

No. 6. pr. 1 m²	Number	Alcohol weight
Abra prismatica	7,0	0,30
Solen ensis	4,0	0,10
Mactra subtruncata juv.	1,5	0,05
Psammobia færøensis	2,0	0,05
Venus gallina	3,0	0,60
Dosinia exoleta?	5,0	0,15
Astarte Banksii	1,0	0,30
Natica pulchella	0,5	0,05
Bela turricula	1,0	0,05
Harmothoë sp.	Fragm.	0,10
Nychia sp.	0,5	0,05
Glycera capitata	Fragm.	0,10
Aricia armiger	»	0,25
Nephthys sp.	»	2,10
Cirratulus sp.	»	0,05
Ophelia limacina	7,5	0,25
Travisia Forbesi	2,0	0,15
Pectinaria sp.	1,0	0,05
Amphiura filiformis	0,5	0,05
Ophioglypha albida	3,0	0,70
» affinis	10,0	0,45
Astropecten sp.	0,5	0,50
Asterias rubens	1,0	0,05
Echinocardium cordatum. juv.	75,5	10,00
» flavescens.	1,5	
Echinocyamus pusillus	15,0	0,35
Diastylis Rathkei	3,5	0,05
Gastrosaccus spinifer	0,5	0,05
Portunus depurator	1,0	0,50
Dissolved in Alcohol		0,75
		18,20 (1,57)

Ca. 31 miles W. by S. $^1/_2$ S. of Thyborøn channel. coarse brownish yellow gravel without distinct brown layer.
20 samples à 0,1 m². — Depth 34 meters.
1911, August 29'. Temp. 12,8° C.

No. 7. pr. 1 m²	Number	Alcohol weight
Tellina pusilla	5,0	0,35
Thracia papyracea	1,5	0,05
Solen ensis	8,0	0,45
Mactra solida	2,5	14,20
» subtruncata	0,5	0,05
Dosinia exoleta?	2,0	0,20
Natica pulchella	1,5	0,05
Glycera capitata	Fragm.	0,05
Aricia Cuvieri	0,5	0,05
Nephthys sp.	Fragm.	1,50
Ophelia limacina	2,5	0,30
Terebellidæ	Fragm.	0,10
Nemertini	»	0,10
Ophioglypha albida	6,5	0,85
» affinis	6,0	0,10
Asterias sp.	2,0	0,10
Echinocardium pennatifidum juv. / » flavescens juv.	65,0	5,15
Echinocyamus pusillus	60,0	2,75
Gammaridæ	14,0	0,30
Diastylis Rathkei	2,5	0,05
» rugosa	2,5	0,05
Gastrosaccus spinifer	30,0	0,60
Portunus sp.	2,0	0,10
Crangon vulgaris	1,5	0,10
Amphioxus lanceolatus	1,5	0,15
Dissolved in Alcohol		0,85
		28,60 (2,495)

Ca. 19 miles W. by S. ½ S. of Thyborøn channel.
Light sand and gravel without distinct brown layer.
20 samples à 0,1 m². — Depth 26 meters.
1911, August 29'. Temp. 15,3° C.

No. 8. pr. 1 m²	Number	Alcohol weight
Tellina fabula	2,0	0,533
Solen ensis	0,7	0,033
Mactra subtruncata	832,0	2103,800
» » juv.	22,0	0,667
Venus gallina	3,0	4,433
Nassa pygmæa	0,3	0,033
Natica pulchella	1,0	0,100
Bela turricula	0,3	0,033
Phyllodoce maculata	1,0	0,433
Nereis sp.	0,7	0,067
Aricia armiger	Fragm.	0,100
Nephthys sp.	»	0,200
Ophelia limacina	0,7	0,033
Ammochares assimilis	0,3	0,067
Ophioglypha albida	0,7	0,033
» texturata	0,3	0,100
» affinis	1,0	0 033
Asterias rubens	0,3	4,067
Echinocardium cordatum	4,3	9,333
Gammaridæ	2,3	0,067
Diastylis sp.	1,7	0,033
Gastrosaccus spinifer	2,0	0,067
Portunus holsatus	0,3	0,667
Pagurus sp.	0,3	0,300
Crangon Allmani / » vulgaris	1,0 / 0,7	0,200
		2125,432 (85,92)

That in Alcohol dissolved stuff wanting.
From 2 miles W. by N. of Thyborøn channel to 2 miles W. of Thyborøn channel.
Hard »blue clay« in the 10 first, coarse sand in the 20 last samples.
30 samples à 0,1 m². — Depth 20,7—24,5 meters.
1911, October 5'.

No. 9. pr. 1 m²	Number	Alcohol weight
Solen ensis	1,5	0,10
Mactra subtruncata	1,0	0,10
Venus gallina	1,0	0,80
Natica pulchella	1,0	0,05
Bela turricula	1,0	0,05
Philine sp.	1,0	0,10
Nephthys sp.	1,5	0,20
Ophelia limacina	9,5	0,50
Nemertini	1,0	0,70
Planaria	0,5	0,05
Ophioglypha albida	0,5	0,05
» texturata	0,5	0,20
» affinis	1,5	0,05
Astropecten Mülleri	2,0	3,00
Spatangus purpureus	4,0	0,60
Echinocardium cordatum juv. / » flavescens juv.	20,0 / 4,0	6,90
Echinocyamus pusillus	8,0	0,20
Gammaridæ	8,5	0,20
Diastylis sp.	0,5	0,05
Gastrosaccus spinifer	8,0	0,20
Portunus sp.	0,5	0,05
Crangon vulgaris	0,5	0,40
Amphioxus lanceolatus	0,5	0,10
Ammodytes sp.	0,5	0,10
		14,75 (0,715)

That in Alcohol dissolved stuff wanting.
6 miles W. by S. of Thyborøn channel.
Coarse sand and small stones.
20 samples à 0,1 m². — Depth 24,5 meters.
1911, October 5'.

No. 10. pr. 1 m²	Number	Alcohol weight
Mactra subtruncata	4,0	4,90
» » juv....	392,0	14,70
Donax vittatus	2,5	0,85
Nephthys sp.	Fragm.	0,25
Gammaridæ	0,5	0,05
Eupagurus Bernhardus juv.	0,5	0,10
Crangon vulgaris	1,0	0,35
		21,20
		(0,92)

That in Alcohol dissolved stuff wanting.
Close to the shore, off Rønland.
S. of the channel.
Fine light sand with shells.
20 samples à 0,1 m². — Depth 8,4 meters.
1911, October 5'.

Summary of the valuation lists.

	No.	Page
The Kattegat.		
B. n. Stations	13, 20, 10, 25, 5	1—2
B. T. —	19, 16, 42, 24, 4	2—4
Haploops Stations	6, 7, 22	4—5
E. T. —	14, 46, 41, 11, 31	5—6
Reduced E. T. Stations (Nr. 8 with R. M.)	9, 35, 33, 36, 8	7—8
E. (v) Stations	40, 26, 30, 23, 32, 29	8—10
E. v. —	15, 44, 43, 21, 27, 2, 34.	10—12
v. —	1, 38	13
d. — and allied poor Stations	12, 37, 28, 39	13—14
The Skagerrak	17, 18, 45	60
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d. Stations and allied	8, 12, 18, 19, 28, 29	23—25
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a b c Stations with R. M.	2 a, b, c, 22, 24	25—26
N. of Sprogø, a b c Stations, frequently with E.	9, 11, 13, 15, 25, 26	27—28
S. of Sprogø, a b c Stations without E.	4 a, b, 6 a b c d e, 8 a, b, 21	29—32
Poor a b c Stations without E. etc.	5, 7, 17, 18, 27, 28	32—34
d. Stations, Nyborg Fjord	1 a, b, c, 16 a, b, 19, 31	34—36
d. Stations N. of Sprogø	12, 14, 29 a, b	36—37
d. Stations S. of Sprogø	3 a, b, 10, 20, 23, 30	38—39
Little Belt.		
a b c Stations, as a rule with Cyprina	1, 2, 4, 5, 9	40—41
d. Stations	6 a, b, 7, 8 a, b, 10	41—43
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a b c Stations, frequently with Cyprina, and sometimes with d.	1, 2, 3, 4, 5, 6, 7, 10, 11, 12	43—46
d. Stations	8, 9, 13	47
The true Baltic.		
d. Stations	1, 2, 3, 6, 7, 8, 9	48—50
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In the valuation lists the weight is everywhere given in grams.

Where the number of specimens has made counting difficult, there is the sign ∞, and where their condition has made an exact counting impossible this is indicated by Frgm. (fragments) or a +.

Where very large numbers of small animals are present, the number has sometimes been determined by counting a certain weight of them, e. g. by weighing and counting $^1/_{10}$th of the whole mass. This applies for example to *Haploops tubicola* for Station Kattegat No. 22 and to *Maetra subtruncata* for the Kattegat Stations Nos. 43 and 44.

C. G. Joh. Petersen: Om de skalbærende Molluskers Udbredningsforhold i de danske Have indenfor Skagen 1888. 8°. 1162 pg. 2 Kort.

Det videnskabelige Udbytte af Kanonbaaden »Hauch«s Togter i de danske Have indenfor Skagen. 1893. 4°. 464 pg. Atlas i folio.

Indhold: Echinodermata (Petersen), Diatomeer (Cleve), Undersøgelse af nogle Bundprøver (Rørdam), Mollusca (Petersen), Cephalopoda (Posselt), Crustacea malacostraca (Meinert), Hydrografi (Rørdam), Polyzoa (Levinsen), Ascidiæ simplices (Traustedt), Annulata, Hydroidæ, Anthozoa, Porifera (Levinsen), Nogle alm. Resultater (General Results. Engl.) (Petersen).

C. F. Drechsel: Oversigt over vore Saltvandsfiskerier med Kort og Planer. 1890. 4°, 100 pg. Med et Tillæg: »Om Naturforholdene indenfor Skagen« af *C. G. Joh. Petersen*. Med Kort. 4°. 46 pg.

Fiskeri-Beretning for 1888—89, 89—90, 90—91, 91—92, 92—93, 93—94, 94—95. 95—96, 96—97, 97—98, 98—99, 99—1900, 1900—01, 1901—02, 1902—03, 1903—04, 1904—05, 1905—06, 1906—07, 1907—08. 1908. 1909. 1910.

Beretninger fra den danske biologiske Station findes paa dansk publicerede i de tilsvarende Fiskeri-Beretninger.

I. Fiskenes biologiske Forhold i Holbæk Fjord. 1890—91. 63 pg. Med et Kort.
II. Om vore Kutlingers (*Gobius*) Æg og Ynglemaade. 1892. 9 pg. Med 2 Tavler.
II. On the Eggs and Breeding of our Gobiidæ. 1892. 9 pg. Two Plates.
III. Det pelagiske Liv i Fænø Sund etc. 1893. 38 pg. Tabeller.
III. The Pelagic Life in Fænø Sound etc. 1893. 38 pg. Tables.
IV. Om vore Flynderfiskes Biologi og om vore Flynderfiskeriers Aftagen. 1894. 146 pg. 2 Tavler. 1 Kort og mange Tabeller.
IV. On the Biology of our Flat-fishes and on the decrease of our Flat fish Fisheries. 1894. 146 pg. 2 Plates. 1 Chart. Many Tables.
V. Den alm. Aal (*Anguilla vulgaris* T.) anlægger før sin Vandring til Havet en særlig Forplantningsdragt. 1896. 35 pg. Med 2 Tavler.
Etc. 64 pg.
V. The common Eel (*Anguilla vulgaris* T.) gets a Particular Breeding-dress before its Emigration to the Sea. 1896. 35 pg. With 2 Plates.
Etc. 64 pg.
VI. Om Rødspætteyngelens aarlige Indvandring i Limfjorden etc. 1887. 49 pg. 1 Kort. 2 Tabeller.
VI. The Yearly Immigration of young Plaice into the Limfjord etc. 1897. 48 pg. 1 Chart. 2 Tables.
VII. Plankton-Studier i Limfjorden. 1897. 23 pg. 1 Kort. 4 Tabeller.
VII. Plankton Studies in the Limfjord. 1897. 23 pg. 1 Map 4 Tables.
VIII. Om et Skovl-Vaad til Undersøgelse af dybere Farvande. 1898. 24 pg. 10 Figurer.
VIII. An Otter-Seine for the Exploration of Deeper Seas. 1898. 24 pg. With 10 Figures.
IX. Travlinger i Skagerak og det nordlige Kattegat i 1897 og 98. 1899. 56 pg. 1 Kort.
IX. Trawlings in the Skager Rack and the Northern Cattegat in 1897 and 98. 1899. 56 pg. With One Map.

X. Fortegnelse over Aalerusestader i Danmark etc. — Mindre Meddelelser. 1899 og 1900. 36 pg. Et farvetrykt Kort.

X. List of The "Aalerusestader" in Denmark, etc. — Smaller Communications. 1899 and 1900. 37 pg.

XI. I. Torskens Biologi i de danske Farvande. II. Om andre Torskefisk i vore Farvande. III. Nogle almindelige Betragtninger om Fredning, Lovgivning etc. IV. Ændringer og Forbedringer af Skovl-Vaad til zoologisk Brug. 1900 og 1901. 44 pg.

XI. I. The Biology of the Cod in the Danish Seas. II. On other Codfishes in our Seas. III. Some General Observations on Protection, Legislation etc. IV. Alterations and Improvements on Otter-seines for Zoological Purposes. 1900 and 1901. 44 pg.

XII. I. Hvor og under hvilke Forhold kunne Rødspættens Æg udvikle sig til Unger indenfor Skagen? 1 Kort. II. Smaahvarrernes (*Zeugopterus*-Slægtens) Unger. 1 Tavle. III. Kunne vi optage Konkurrencen med Udlandets Damptrawlere i vore Farvande udenfor det danske Søterritorium? 1902 og 1903. 36 pg.

XII. I. Where, and under what Conditions, can the Eggs of Plaice be developed into Young Fish within the Skaw? II. On the Young Stages of the genus *Zeugopterus*. (With one Plate.) III. Can we enter into Competition with the Foreign Steam-trawlers in our Seas outside the Danish Territorial Limit. 1902 and 1903. 33 pg.

XIII. Fiskeæg og Fiskeyngel i de danske Farvande. (Undersøgelser i 1904 og tidligere Aar.) 1903 og 1904. 81 pg.

XIII. Eggs and Young of Fishes in the Danish Waters. (Investigations during 1904 and earlier years.) 1903 and 1904. 85 pg.

XIV. I. Om Lysets Indflydelse paa Aalens Vandringer. II. Om Aalens Alder og Vækst. 1906. 39 pg.

XIV. I. The Influence of Light on the Migrations of the Eel. II. Age and Rate of Growth of the Eel. 1906. 39 pg.

XV. Studier over Østersfiskeriet og Østersen i Limfjorden. Med et Kort, Temperaturkurver, 3 Tabeller og 2 Tekstfigurer. 1907. 70 pg.

XV. I. First Report on the Oysters and Oyster Fisheries in the Lim Fjord. (70 pg.)

XVI. Aalegræssets *(Zostera marina's)* Vækstforhold og Udbredelse i vore Farvande. 1908. 61 pg.

XVI. On the Ecology and Distribution of the Grass-Wrack *(Zostera marina)* in Danish Waters. (With 9 figures.) 1908. 62 pg.

XVII. Studier over Østersfiskeriet og Østersen i Limfjorden. 1908. 24 pg.

XVII. II. Second Report on the Oysters and Oyster Fisheries in the Lim Fjord. 1908. (24 pg.)

XVIII. I. Om Udbyttet af Limfjordens Fiskerier i de senere Aar samt om Rødspætteindplantningen i 1908. Med 6 Tabeller og 1 Kort. II. Biologiske Undersøgelser over Limfjordens Rødspættebestand. Med 3 Tabeller. III. Om Rejefiskeriets Udbytte fra 1885—1907 og om dets Forbedring ved Fredning. Med 3 Tabeller. 25 pg.

XVIII. I. The Yield of the Limfjord fisheries in recent years and the transplantation of plaice in 1908. With 6 tables and 1 chart. II. Biological investigations on the stock of plaice in the Limfjord. With 3 tables. III. The Yield of the Prawn fishery from 1885—1907 and its improvement by means of protection. With 3 tables. 25 pg.

XIX. Nogle Undersøgelser over Muligheden af at bekæmpe Fiskeriets Skadedyr, særlig Sneglene i Limfjorden. 1911. 20 pg.

XIX. Some Experiments on the Possibility of combating the harmful Animals of the Fisheries especially the Whelks in the Limfjord. 1911. 20 pg.

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